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Original Articles.

THE BRITISH ANTARCTIC EXPEDITION, 1910-1913

By Staff Surgeon E. L. Atkinson, R.N.

Snow Blindness.

The following observations refer to periods from November to January in each year during which time the sun is at its maximum altitude and the light at its brightest. Where a party is on land with black rock the relief is marked, and therefore most of the observations refer to the level white plain of the Barrier. For the physical part of these I am indebted to Mr. C. S. Wright, B.A., who was the physicist to the Expedition.

The strength of the illumination was taken by means of a Watkins's exposure meter. A rapid light facing the sun ranged from one and a quarter to ten seconds; the strongest light recorded has been 1 by the same meter in California. On dull overcast days the light varied from 4 to 20; the illumination in a studio is from 10 to 20. On bright days the altitude of the sun has a great deal to do with the intensity of the light on account of the absorption by the atmosphere. Therefore the liability to snow-blindness on bright days is more pronounced towards noon. Up to the present, and until further observations can be made in England, there is nothing definite known as to the quality of the rays causing snow-blindness.

Snow blindness may roughly be divided into three kinds according to the light

(1) On high land in the interior in bright sunshine with a blue sky.

(2) Overcast sky with high land but no contrast. On low land the light is very diffused.

(3) Dull overcast sky with low land. Contrast is hardly visible.

Effect of Bright Days.—If snow-blindness, even for a few minutes, a half-dozen times in a day, an attack of snow-blindness was preferable to the effects of the sun. The eyes felt perfectly well while in the tent, but the slightest attempt to look out of doors was followed by the most excruciating pains within a few minutes. It was impossible to keep the eyes open. There was a profuse flow of tears and intense photophobia. Photopholia was usually absent. This condition lasted from twelve to twenty-four hours, and was followed by a period of from twelve to twenty-four hours during which it was impossible to open the eyes, and the condition was accompanied by intense conjunctivitis, and by a feeling of the presence of foreign bodies in the eyes.

The usual treatment for snow-blindness was with cocaine, by dropping into the eyes a solution composed of zinc sulphate, boracic acid, and a few drops of laudanum. A few minutes after the drops had been applied, the eyes were bathed with a solution of boracic acid. This was found to be of the greatest benefit. Unluckily the supply was small and the zinc sulphate laudanum generally lost or broken. On sledging journeys, goggles used to be worn, but having been worn into a rough poultice with the moisture from the eyes and the snow-goggles themselves always proved a source of discomfort and were discarded.

On Overcast Days with Snow and Diffused Light.—The effect of twofold the want of contrast in which by long-continued periods of light was evident. The absence and reflection of light from the surfaces of mountains and hills, which were constantly falling. The light then appeared to fall in all directions equally, and it was impossible to distinguish the difference between land and sky or horizon appearing as a white blur, being practically bounded by the skis on the feet. Contrast was entirely absent for the use of want of shadow, and in an instance, it was possible to be standing within arm's length of a snow cairn 9 ft. high, and yet the cairn was invisible. Eye strain was continuous, the eyes striving to make out whether the foot was being placed on an even surface and it was impossible to appreciate inequalities such as sastrugi. At the same time the illumination was intense

[illegible] and lasted [illegible] accommodate for [illegible]

[illegible] *Days.*—[illegible]

[illegible]

A [illegible] men was [illegible] 8.30 p.m. on the [illegible]. This he did [illegible] with low drift [illegible] logically 9.10. [illegible] December with [illegible] his [illegible] ness. He worked [illegible] with [illegible] the 17th December [illegible] with an [illegible] snow blindness, with [illegible] and conjunctiv[illegible] not marked.

Precautions of Scott's Shore Party.—The form of leather snow goggles used by the Expedition prior to the previous experience of Dr. E. A. Wilson. The chief deficiency was that the glass was [illegible] and the ventilation was therefore a frequent cause of misting. A better form of glass would be one mounted at right angles to the eye, which would allow more ventilation. It would also be necessary to obviate any strong light being admitted from the sides. The main object in the design of these glasses was to prevent any metal coming in contact with the features. In every other way they were suitable and comfortable. The colours of the glasses were—light to deep amber, light to deep green and dull red purple. There is no doubt that the most suitable from every point of view were the amber glasses and their effect upon the spectrum would lead one to support this conclusion. These glasses strictly speaking, ought to be the most suitable for the mental effect. I tried these glasses on the Barrier during Relief Expedition of October and November 1912. The amount of contrast they gave through being practically a monochromatic light was splendid and I cannot say that they had any bad effect upon the temperament. The most suitable glasses for Barrier are those which cut out largely the blue and violet ends of the spectrum and one noticed continuously on those dull days that men who had those were in comparative comfort. As an example of this an officer, who, being myopic had to wear tinted glasses continuously and actually possessed worse sight than any of the shore party yet was able to pick up cairns on the way back when the rest of us were quite unable to appreciate them at all. During bright days on the Barrier it was essential that the glasses should be worn at all times. It was a matter of usage to become accustomed to this. At first when one was inexperienced at sledging time the glasses were liable to be taken off. On bright days the natural effect followed and one had to suffer from an attack of snow blindness. The influence of the altitude of sun was well exemplified on the southern journey. Marching south over the Barrier had been carried on during the night time and for a good part of this period we were able to work without our glasses. At the foot of the Beardmore the routine was changed to day marching. Thinking that the conditions were the same, we did not wear our glasses. The result was a sudden and plentiful attack of snow blindness which came at the most awkward part of the whole march.

The first attack of snow blindness always rendered one more

[illegible] attacks Men [illegible] from those with deep [illegible] also was found to be [illegible] less liable to the [illegible] disease

Frost-bite

Frost-bite in this form may be compared with the [illegible] scald The [illegible] from the less to the [illegible] skin to the [illegible] of limbs

Frost bite of the Nose —While [illegible] common and well-known experience to [illegible] the nose or [illegible] upon which [illegible] unconscious that mischief was wrong When [illegible] removed the warm hand began to [illegible] upon the offending part At the same time it [illegible] would be with turn away from it We [illegible] with a slight tingling sensation the circulation returned to the part and in the course of a day or two there was merely a small [illegible] spot of dark Parts which had been subjected to [illegible] more bitter frosts attacks and also had been [illegible] when I [illegible] would pump up on [illegible] and rubbing me briskly that the [illegible] by means to bring it back

Frost-bite of Small Digits caused [illegible] varying degrees substance [illegible] implanted It was quite common after [illegible] shrunken tips for the fingers to be [illegible] of the end This condition was due to [illegible] of varying degrees caused by exposure to cold and its [illegible] cold in metallic objects like the end of primus These [illegible] were of no importance When the patient returned they were [illegible] with the result that after some time the catch [illegible] the fingers became normal again [illegible] lessons will be [illegible] bathing in [illegible] and dressing with Hazeline cream was found to be the best method of treatment There were [illegible] to the [illegible] of handling of cold metal objects the fingers [illegible] went to the stage of blisters on the skin over it became dull and [illegible] so much was this so that it was [illegible] to appreciate objects [illegible] between the fingers The skin always [illegible] off after and had been [illegible] in the hand [illegible]

Frost-bite of the Hind Legs [illegible] causing blisters [illegible] about [illegible] [illegible] The onset of [illegible] occurred at [illegible] It was never [illegible]

[illegible] to three weeks. [illegible] contained [illegible] fluid and became [illegible] a dark fungat[illegible] [illegible] formed after a varying period

Frost-bite of the second degree.

and then sloughing of the affected part followed. The best treatment was to empty and pare away the blisters, and to keep the parts in baths of boracic lotion, the best dressing being lanolin cream or boracic ointment.

of gangrene in mine during the mild
and the less superficial did not exist any serious
mount which the majority of frost bite
the application of warm bandages to the affected part
The application of snow is probably as good a method
at the same temperature as the air
Moreover the snow on the Antarctic is
many grains and the difficulty of finding
would probably be more than the
advantage

well be certain that one had to
the warm hut The effect of heat on the
was well marked After having been out
for three hours all day one may
began to feel the first bites would come The
camping and living in these huts was immediately
heart began gradually to glow spreading outwards
from the feet and hands until the whole body felt
days when out sledging over Hut Point
still one was not allowed to stay in the huts more than
or stone and with a view of improving the facilities
which must be expected during many days
confined within the tent

Clothing

Clothing in the Antarctic is usually divided by men
into three classes, the Eskimo, the woollen Norwegian and
woollen clothing, the last having been worn in the
Antarctic by the whole of the sledging parties The first
three from which the Eskimo clothing was originally
certain points of difference between the Eskimo and that
known by the latter name but all three may be said for
Antarctic exploration On this fishing, consisted of an undervest
of extra length which was supplied by the Lindsay Woolsley
Company The feet of the vest was doubled, so that one had
an extra protection when lying in the sleeping bag on the ground
The vest was about three times as thick as the ordinary winter
garment of the time Over this a woollen sweater was worn, and in
cold weather a thick reefing coat as well Pants were of the
same material and about three times as thick as those for use

in temperate [illegible]. For the legs I wore continuously a pair of wind proof trousers carrying at the [illegible] strapped to the sledge a rough smock of the same material. The head ears chin and neck were covered by a woollen helmet. As the ears are especially vulnerable the sides of the helmet were covered over by wind proof. For really cold sledging a nose nip was also needed. This was sewn on the top of the helmet and usually made of some soft fur covered on the outside by wind proof. It was attached to two pockets on either side of the cap flaps. When not in use it was stowed under the helmet between that and the hood. This arrangement served the purpose of freeing the nose nip from ice and keeping it soft and fit to use.

Socks and mitts were perhaps the most important items of the kit. The best socks were grey hand knitted. These supplied by the Lindsay Woolsley Company. Two pairs of them were usually worn, and in addition a thick outer pair of good hair mukluks Norway. The success of these made by the Lindsay Woolsley Company were due to the following points: they were strong and reliable and one might almost say never wore out. At the same time they were of fine texture and if the perspiration from the feet had frozen upon them they would dry quickly when hung out for the night. The goat hair socks would also dry quickly, but they were extremely rough and it was almost impossible sometimes to put on a sock that was as hard as a board. It was essential each night on camping to change the foot gear immediately the socks having become saturated with perspiration. A special kind of very thick woollen material were kept for sleeping in and these remained practically dry. Over these was worn a close fitting bag of some fur. When the socks were changed they were pinned together with a safety pin and hung outside on a line stretched between two ski sticks. If there was a good sun by next morning they were completely dry and comfortable.

The mitt question is largely a matter of experience and mine more than any other kind of garment. The following were found to be of the greatest general use in summer and winter wool a pair of half mitts of fairly thick woollen material, extending well up the arm and pinned in that position to prevent their falling down. They reached half way down the fingers, and the thumb was in a separate compartment. Over these were worn a pair of very light woollen mitts the compartment for the fingers was single, and there was a separate one for the thumb. The mits were cut short so that they only extended to the junction of the wrist with the hand

[illegible] stepped into them Mitts with a prolonged wrist could not be donned when frozen It was also possible through the day light nature to dry them quickly and to handle the cooker when wearing them Under summer conditions there were suitable but ordinarily one wore as well over all a pair of fur mitts In this again the thumb was separate and the fingers were in a separate compartment They were suspended from the mast by means of long wick so as to be always ready in case of need

Over the socks Lunneskoe or Lunn shoes were worn These were made from the better parts of reindeer hide It was just as essential to see that the Lunneskoe were dry as the socks As soon as camp was reached they were removed and allowed to freeze roughly into the form of the foot They were then hung outside to dry The life of Lunneskoe depended almost entirely on the amount of care taken to brush them clean of snow before entering the tent Minute particles of moisture would be sure to cause loss of their hair and in consequence also of their properties of preserving warmth To keep the Lunneskoe well in place it was advisable to wind puttees round their tops and over the wind proof trousers During cold weather with the temperature below – 30° F there was always an accumulation of frost and ice between the pants and the outer wind covering This was shaken out at the end of the march If the puttees were worn high for instance up to the knee the accumulation occurred there and was extremely uncomfortable It is better therefore to confine the puttees to the lower half of the leg A wind helmet was also worn and was best sewn on the back of the wind proof smock It had a rounded funnel stiffened in the outer part by wire so that it would be roughly shaped and trimmed to the wind The remainder of the helmet consisted of wind proof with a long neck so that the whence could be tucked within the neck piece of the smock These helmets were uncomfortable and when once worn in cold weather were difficult to take on and off The breath and perspiration froze within them and made them extremely hard

The Ventilation Sanitation and Warming of the Hut

The hut was a building 30 ft by about 25 ft It was placed upon a level piece of ground without any pedestals The walls consisted of several sheathings and in the intervening spaces

machine [illegible] uninflammable [illegible] placed [illegible] was [illegible] substance known [illegible]

[illegible] by means of the [illegible] which was kept [illegible] day and night. During the [illegible] part of the winter [illegible] necessary to [illegible] at the other end [illegible] and from the [illegible] the central part of the [illegible] tunnel connected with an upright funnel [illegible]

[illegible] by means of an [illegible] through the central part of the roof [illegible] through the [illegible] was found to be [illegible] during this [illegible] through the [illegible] the floor [illegible] supplemented by [illegible] through [illegible] When the [illegible] was [illegible] The [illegible] The temperature [illegible] varied from [illegible] the morning [illegible] hung to dry.

[illegible] was [illegible] which was [illegible] matter [illegible] and [illegible]

HEALTH [illegible] WINTER

Measures [illegible] Scurvy

It is essential in maintaining the health of a party under [illegible] conditions that if possible at least two [illegible] hard [illegible] taken every day. This was a routine that was [illegible] out the [illegible] winters and was only neglected during bad weather, when it was impossible to go out. Nearly every [illegible] first [illegible] exercise his pony and in the second [illegible] his [illegible] Other exercises were found by digging holes through the [illegible] order to catch fish, walking, skiing, and [illegible] generally [illegible] but were dependent on the weather. During the morning all hands were employed doing work [illegible]

generally [illegible] party had received their instructions [illegible] allowed to regard the [illegible] was an abundance of [illegible] Expedition was invariably [illegible] measurements and weights [illegible] capacity and grip were [illegible] observations were taken [illegible]

[illegible]

10th May 1911.	[illegible]	[illegible]
Griffith Taylor	N 81	[illegible]
Cherry Garrard	N 80	[illegible]
Bowers	N [illegible]	[illegible]
Capt. Scott	N [illegible]	[illegible]
Simpson	N 80	[illegible]
Gran	N [illegible]	[illegible]
Crean	N 80	[illegible]
Debenham	N [illegible]	[illegible]
Ponting	N 81	[illegible]
Oates	N [illegible]	[illegible]
Wright	N [illegible]	[illegible]
Meares	N [illegible]	[illegible]
Lieutenant Evans	N 80	[illegible]
Dr. Wilson	N [illegible]	[illegible]
Evans, C. J.	N 80	[illegible]
Keohane	N 80	[illegible]
Ford	N 80	[illegible]
Lashley	N 80	[illegible]
Atkinson	N [illegible]	[illegible]
Nelson	N 80	[illegible]
Day	N 80	[illegible]
Hooper	N [illegible]	[illegible]
Glissohl	N 80	[illegible]
Anton	N [illegible]	[illegible]
Dimitri	N 80	[illegible]

20th June 1911	[illegible]	[illegible]
Cape Crozier Party	[illegible]	[illegible]
Dr. Wilson	N 80	[illegible]
Lieut. Bowers	N 80	[illegible]
Cherry Garrard	N 80	

Wrong side [illegible]

(All taken at N/40 none tested at N [illegible] all on tent Debenham Lieutenant Evans and [illegible] Debenham taken on arising from bed [illegible]

The method used was that of Sir Almroth Wright prevention of scurvy being the primary object of the investigations. The above lists give the observations and also the effect of the

were [illegible] Dr Wilson Lieutenant [illegible] and Cherry Garrard The normal limits were supposed to be between N/25 and N/[illegible] A minus sign means that the reaction of the litmus paper was [illegible] at that dilution A plus sign means that the reaction of the litmus paper was marked at that solution

Immediately after landing we took the trouble to secure as much fresh food as we possibly could This consisted of Skua gulls Adelie penguins, and Weddel seals The seals were skinned, and their carcases frozen for future use The penguins and skuas were skinned and gutted and a large cave was dug in a big ice drift wherein the carcases were stowed Besides these we had stored in the ice chamber of the Terra Nova nearly a hundred carcases of sheep from New Zealand As these were infected superficially with a fungus, it was thought advisable to use them only sparingly Seal meat formed a constituent of at least two meals a day and we were allowed mutton only on Sundays as a treat Seal flesh is an excellent anti scorbutic It is extremely rich in blood, freezes firmly, and owing to the sterile atmosphere cannot deteriorate It is slightly distasteful to many people especially if they have been obliged to perform the gutting of the seal but when hungry we could all appreciate this food, and eat very large amounts Penguins are good eating, but they are not economical because of the large proportion of bone

The only case of scurvy that occurred was attributable to easily explainable causes Lieutenant Evans was away from the Hut for two months before starting on the southern journey During this time he lived entirely on sledging provisions He was dependent for his food on being able to return from time to time to the Hut and from there obtain fresh supplies As the weather was bad this was not always possible He therefore started on the southern journey two months to the bad as compared with the rest of the party

The fate of the Southern Party was due entirely to starvation and exposure In their case there was no mention and no sign of scurvy at all It is quite easy in these climes to prevent any symptoms of scurvy This was shown in the case of Lieutenant Campbell and his party who, living under the worst conditions for contraction of the disease came through without any ill effects

Effect of Sledging upon the Individual

The Effect of Concentrated Food after Man-hauling for more than two Months—All parties noticed after being out for more than

two months [illegible] practically [illegible] from this [illegible] became exactly like a machine. With [illegible] to go on for some time and [illegible] certain [illegible] With a little extra food a little more work could be [illegible] After the period one began to expend the body tissues on the ration that was provided. On the return from the southern journey emaciation in every case was extreme and the effects of cold were naturally much more severe in this state. Owing to the fatty nature of the food defæcation was extremely easy and in this way we reacted immediately to any increase of food.

The Monotony of Travelling over a Dead White Surface on overcast days when no horizon was visible was extremely marked. It can only be likened to an intellectual starvation and we became dependent upon various methods of whiling away the tedium of the march even to counting the number of our steps.

The Effect of a Cold Trip upon the Constitution was very noticeable, though no definite symptoms could be observed. In any trip extending up to a week where the temperature was continuously below — 40° F. the men returned in very poor condition. During this time one never while in the sleeping bag got any consecutive sleep, and once or twice there were authentic instances of men sleeping while actually under way. This want of sleep caused a general lowering of the constitution so that lassitude after a cold sledging journey is a thing always to be remembered. After these cold trips the feet which had been in continuous contact through the Finneshoe with the cold snow became very much congested. This congestion lasted for some time after the return, and gradually wore off. I believe it was simply a compensating effect.

The Results of the Strong Light and also its reflection from the snow were marvellous as regards the deep pigmentation of the skin. Members crossing the Barrier became very nearly the colour of negroes and this was entirely due to the effect of the strong light.

Men who returned from the southern journey were extraordinarily weak in certain of their muscles. They could have pulled the sledge throughout a very long day but whereas before leaving they could have lifted 100 lb. easily on their return after three months there was some difficulty in lifting even 30 lb. Certain muscles became trained, and could go on almost automatically.

The Dysentery appeared by Shackleton is evidently from past experience a most [illegible] be readily [illegible] party of men [illegible] compressed [illegible] a long period [illegible] fed on [illegible] frequent diarrhoea [illegible] the first few days after the return from [illegible] will to restrict the diet [illegible] lives on soft foods [illegible] is possible Shackleton when he reported [illegible] me down to his last pony hill and there the [illegible] well earned meal On each occasion when [illegible] the attacks of dysentery supervened Decay [illegible] most in these climes The ponies which were [illegible] at the foot of the Beardmore were covered with snow and when the first party reached the carcases were in parts uncovered the stench being horrible Saprophytic bacteria were already present and the dark meat being warmed by the sun rapidly decomposed This may be looked upon as an aggravating cause of the enteritis

I

WOUNDED TREATED AT THE ROYAL NAVAL HOSPITAL, SHOTLEY

By [illegible] CHRISTOPHER [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] where these shell fragments had [illegible] little distance, it was found more satisfactory [illegible] opening and push them out, rather than [illegible] through the entrance wound.

[illegible] I may mention that the precise location [illegible] by the use of the X-rays was often a matter of [illegible] frequently found in quite a different [illegible] strata of the radiographs would lead one [illegible]

[illegible] were of every shape and size, and only [illegible] which were always sharp and serrated [illegible] few grains to four ounces, and on them [illegible] pushed before them such foreign bodies as [illegible] wood fragments of bone and pieces of [illegible] which were frequently found embedded in the [illegible]

[illegible] evidence to show that at the time of entry the [illegible] were at a high temperature, the edges of the [illegible] and charred, and the blood vessels in some cases shrivelled up and rendered as if touched by a cautery under the temperature of the shell I think is to be attributed the comparatively little hæmorrhage which occurred from some of the larger wounds.

Many of the shell wounds were of great extent, large pieces of the tissues being blown away *en masse*, and the edges of the cavities left so crushed, seared and pulverized, that nothing in the way of plastic surgery was possible. As many cases were not received till a considerable time had elapsed after the injury, often as much as forty-eight hours, little in the way of treatment was possible beyond gentle irrigation with weak antiseptic lotions, and the insertion of large tubes to provide efficient drainage.

In the case of compound fractures, and of joints which had been opened, if the cases were seen within twenty four or thirty six hours of the infliction of the injury, the surrounding skin was disinfected the wounds swabbed out thoroughly with a strong antiseptic (equal parts of 1 in 40 carbolic acid and 1 in 500 perchloride of mercury) and sterile dressings applied, in the hope of destroying any septic organisms which had found an entrance: but, although in some cases this treatment met with success, in others it was necessary to open up again and drain freely. In the compound fractures and joint injuries, where amputation became necessary the question of where to remove the limb became a matter for

[illegible] healing [illegible] con[illegible] apparently [illegible] of tissue [illegible] [illegible] [illegible] with [illegible]

Shell Wounds of the Head

Twenty-[illegible] [illegible] [illegible] besides superficial [illegible] through the soft tissues [illegible] comprised the following:—

A fracture of the base [illegible] compound fracture of the vertex [illegible] bones of the nose [illegible] superior maxillary bones, a case of avulsion of the [illegible] of the nose, several cases of complete destruction [illegible] through the cheek with laceration of the tongue [illegible] and through the parietal [illegible] wound of the orbital [illegible] sheath.

The compound fracture [illegible] which was in the frontal region [illegible] appeared trivial as [illegible] wound was examined only a hole admitting [illegible] could be observed through the [illegible] of the [illegible] Suppuration [illegible] however were [illegible] and on [illegible] it was observed that a large portion [illegible] was [illegible] and had been driven into the [illegible] The case proved fatal. Although all fragments [illegible] and depression of the subdural space had probably occurred [illegible] subsequently formed [illegible] difficult to [illegible] [illegible] [illegible] no shell fragment was observed [illegible] it was conceivably caused by a [illegible] blow [illegible] [illegible] with some small [illegible]

Shell Wounds of the Thorax

One [illegible] was admitted where the clavicle was shattered, the first rib fractured and the apex of the lung [illegible] for an area of about [illegible] square inch at the bottom of the wound. There was extensive [illegible] surgical emphysema over the [illegible] and side of chest, but

[illegible] becoming gradually [illegible] over the lung

SHELL WOUNDS OF [illegible] ABDOMINAL VISCERA

Most of the [illegible] on the mortuary patients having [illegible] hæmorrhage. Amongst these were [illegible] practically disembowelled, and in [illegible] almost instantaneously.

One man who [illegible] suffered from a shell wound on the right hypochondrium [illegible] with an exit wound near the middle [illegible] shell had grooved the peritoneal surface of the [illegible] but had not penetrated it, but with it a long piece of omentum which was [illegible] and torn. The intestines [illegible] and the man would probably have survived had not an additional wound been inflicted with a rifle bullet [illegible] lower limbs.

A case which was [illegible] rest of the right [illegible] a piece [illegible] superior spine [illegible] The initial shock which was [illegible] with a [illegible] and patient seemed to be progressing favourably when [illegible] he suddenly collapsed with epigastric [illegible] of blood and a rapid thready pulse. There was [illegible] abdominal distension with some rigidity and [illegible] hours later. An autopsy showed that a [illegible] had travelled upwards and inwards to the [illegible] along the line of the attachment of the [illegible] branches of the gastro-duodenal [illegible] arteries bulging behind the [illegible] and [illegible] The lower end of duodenum and about [illegible] jejunum were ribbed of blood supply of a [illegible] colour and about to become gangrenous. There was considerable internal hæmorrhage along the attachment of the mesentery. The probable cause of the sudden collapse was fresh hæmorrhage into the retroperitoneal tissue.

A shell wound in the loin was associated with injury to a kidney causing hæmaturia occurring and persisting for about a fortnight. No shell fragments could be discovered either by probing or by the X-rays, and with rest and free drainage a complete recovery ensued.

Injuries to Nerves

Injuries to [illegible] nerves with [illegible] were fairly [illegible]

The seventh nerve was divided in a case where [illegible] was severely [illegible] paralysis of the whole [illegible] face has resulted.

In one instance a shell wound near the elbow [illegible] was found to be completely divided and after the [illegible] carefully dissected out they were united by [illegible] Although this wound has apparently healed and a complete recovery of sensation and function is [illegible]

Injuries to Arteries

In two cases which came under my notice and which ended in the mortuary the femoral artery and vein had been severed in Scarpa's triangle.

A third instance of [illegible] main vessel was a shell wound near the bend of the knee where the tibial artery had been divided. The proximal end of this vessel was found in spasm and could be completely occluded by [illegible] and twisted on itself for about 2 in., which happy result was undoubtedly to be attributed to the high temperature of the projectile causing the injury.

Injuries to Muscles

A kind of local gangrene frequently occurred subsequent to these extensive shell injuries to muscles, and gangrenous shreds of the muscular tissue [illegible] from with a portion of tendon attached, slowly separating and being cast off. This undoubtedly resulted from the crushing and pulping to which the tissue had been subjected and was in some cases hastened by a certain amount of charring from the high temperature of the metal.

Any immediate attempt to restore continuity of tissue was thus seen to be out of the question, and one had to be content with cleaning the wound and providing for efficient drainage by the insertion of large sized rubber tubes.

One exception to a German officer proved rather an exception to the rule. A transverse wound across the middle of both severed all the superficial flexor tendons without injuring the larger vessels and with comparatively little bruising of the tissues. In this case the divided ends of the muscles were united by stout catgut, the wound being closed and the limb put up in a splint

position on plinths with the proximal end of the limb and for a little massage. Simple splints of pasteboard or metal were designed

Injuries of the Joints of the Knee

In this list are included injuries of the patella, fractures of the femur and tibia, and gunshot wounds of the knee-joint with fracture of the condyles of the femur or tibia or of the femur and tibia combined.

Injuries of the knee-joint by gunshot wounds are always dangerous, the tissues round the joint being so thin that the missile usually passes through the joint, and the synovial membrane is very easily infected. Besides the comminution of the fracture, the effusion of blood into the joint is very liable to suppurate.

Although comminution was the rule, it was rarely so great as to leave large gaps between the fragments of the bone, several important exceptions were noted. Among these may be mentioned two compound fractures of the femur, where the bullet had struck the bone obliquely from behind, and had split off a portion of the condyle, leaving the joint intact. The second piece of fracture in each case was small and comminuted, but it was —

(1) The injury was fairly recent; patient was put under chloroform, the wound thoroughly swabbed out with iodine solution (1 in 20), and with solution of equal parts of carbolic lotion (1 in 20) and perchloride lotion (1 in 500), sterile gauze pads and splint.

(2) Treatment was not received till some considerable time had elapsed; after the usual rubbing, large drainage tubes were inserted into the wound, and it was filled with some weak antiseptic lotion (lotion 1 in 60) in which the original same solution.

Now that the application of pure carbolic acid has been so highly recommended, its use will be adopted in future instead of the above-mentioned antiseptic solutions for the first class of cases.

When large joints were hopelessly shattered no time was lost and amputation was performed as soon as the parts could be prepared; but in cases which were on the border line, so to speak, and where a reasonable hope could be entertained of saving the limb, treatment much on the lines of the compound fractures was followed, and the question of amputation was postponed. Injuries to the interphalangeal joints and to the joints of the carpus and tarsus were common, and although in a few cases, owing to extensive crushing, it was necessary to remove the toes and fingers

affected in a number of others free drainage and cleanliness eventually led to the parts being saved and preserved as useful appendages

Where pieces of shell had passed through these smaller joints early movement and massage was found to be of the greatest importance

In the case of injury to the larger joints, where it had been possible to avoid amputation by resorting to irrigation and free drainage, healing was necessarily a slow and tedious process and convalescence was much delayed

One of the most useful means of cleansing these large septic wounds, in connexion with joints or comminuted bone, was by occasional irrigation with a peroxide of hydrogen lotion (10 or even 20 vols. per cent) which seemed to hasten the separation of the sloughs and promote healthy granulation

Secondary Hæmorrhage

In nearly all cases of extensive shell lesions which become septic secondary hæmorrhage is to be anticipated, and may vary from a general oozing during the period of separation of the sloughs to a profuse hæmorrhage when one of the larger arteries has ulcerated. In the former cases, plugging the wound with gauze or the application of a pad and bandage may suffice, but in the latter these methods were found useless and it was always necessary to open up the wound freely and secure the bleeding vessel, which was usually found to be of considerable size. In such cases it would seem advisable to be prepared for a lengthy operation, as the definition of the bleeding vessel is often a matter of considerable difficulty owing to the depth at which it has to be sought and owing to the gangrenous state of the tissues.

The following vessels were those which it was necessary to find and tie for profuse secondary hæmorrhage: the superior thyroid branch of thyroid axis, the long thoracic branch of the axillary, and the peroneal branch of posterior tibial.

The Effects of Lyddite Fumes

I could see no difference clinically between the effect produced on German seamen by the inhalation of fumes from lyddite shells and on our men by the fumes from German mines, save that the noxious gases produced by the explosion in both are very similar, and that the effect is due mainly to nitrous fumes, such as are

given off by the [illegible] (not detonation) of almost any of the nitro explosives. These cases proved the most insidious and most rapidly fatal of any which came under treatment. Patients who were apparently suffering little inconvenience on admission rapidly became asphyxiated and died within twelve to twenty four hours with all the symptoms of an acute capillary bronchitis or bronchopneumonia which evidently resulted from the irritant action of the fumes on the air vesicles and mucous membrane of the bronchioles. They first complained of some pain and tightness across the chest which gradually became worse and was accompanied by cough [illegible] dyspnœa and the expectoration of blood stained frothy mucus. As the minute tubes became more and more blocked with mucus the dyspnœa and lividity became aggravated and violent efforts were made to excite the blood as was seen by the sucking in of the supra-sternal supra-clavicular and intercostal spaces with each breath. Respiration in distress became more and more marked the inspiratory efforts became less effectual and patient gradually passed into a state of coma and finally became quite unconscious. The heart beat feebly for some time after respiration ceased and after death a copious discharge of blood stained frothy mucus from the mouth and nostrils continued.

As regards treatment there is little to be said. Some temporary benefit resulted from the use of oxygen and the bronchitis kettle but no medicines tried seemed in any way to retard the rapidly fatal progress. The use of atropine hypodermically has since been suggested and might possibly be attended with more beneficial results.

Burns from Explosions.

The burns were in the majority of the cases limited to the parts unprotected by clothing, such as the face scalp forearms and hands but the penetrating effect of the flash was seen in some instances where the flame ran up the trousers and burned the legs notably in the case of an officer whose penis was badly burnt through the junction of the trousers in front.

These cases were mostly of a severe nature the depth of tissue destroyed or degree of the burn being variously combined in the same patient and ranging from vesication in some parts to charring of the whole tissues as far as the underlying muscles. Primary shock and marked constitutional symptoms were rarely absent the latter becoming more severe and being accompanied by pyrexia of a hectic type at the period of the separation of the sloughs. Secondary hæmorrhage was not uncommon, and in a case where

reaction was slight, and the symptoms were mostly limited to an alteration in the urine which contained albumin blood and a few casts

Bullet Wounds

The couple of bullet wounds treated were more or less trivial the bullets lodging in the soft parts of a limb and doing little damage

These projectiles were fired from a German machine gun and as they did not traverse the limb must have come from a great distance, or else their velocity had been much reduced by previous passage through some soft resisting substance like a barrier of hammocks they could not have ricochetted because the bullets when extracted were perfect and without a scratch on the cupro-nickel covering

Cases of Strains Contusions and Concussion

These cases presented nothing noteworthy to distinguish them from similar ones of everyday occurrence In every instance they were caused by men jumping overboard and striking themselves against projections on the side of ship or against objects floating in the water

THE NAVAL ACTION OFF HELIGOLAND

By Lieut.-Surgeon WALTER K. HOPKINS, R.N. (Retired)

HAVING visited Shotley Sick Quarters there [illegible] the German mine-layer "Kongin Luise" and of course I was [illegible] and having seen the wounded and cases of illness lying there I was convinced that the most important action on the part of [illegible] on board ship in charge of such wounded was a vigorous [illegible] tion of a wet of antiseptics as early as possible. Suppuration had been very marked in many of the earlier cases and I considered help lecting that this condition might in future cases be [illegible] ably reduced by early vigorous cleansing and inspection of the wound

Having regard to the number of severe injuries I thought it [illegible] to prepare a number of face masks and strips of picric acid gauze dressing ready for immediate use

On 27th August we were hoping to meet the enemy early on the following morning.

On 28th August, at 3.44 a.m. Action was signalled. Our light cruisers (supposed enemy's ships) having been suddenly observed had caused us to take up our stations somewhat earlier than had been anticipated. It was quickly discovered however that the cruisers were our own. Shortly after the first [illegible] was piped to each watch in turn and at about 7 a.m. the enemy ships were actually sighted. From this time on to [illegible] successive actions were fought between various [illegible] the two fleets.

The day was fine and calm while the sun [illegible] very hazy atmosphere in which patches of [illegible] the visual distance from time to time.

I remained on the upper deck during the earlier part of the affair, and found it a most interesting and inspiring sight to watch our destroyers and the "Arethusa" and her divisions dashing at full speed after the enemy while soon the forward spurts of flame from their subs the following reports and the columns of water and spray thrown up by the enemy's shells pitching short or over, began to create in most of us a suppressed excitement which we had not hitherto experienced, telling us that the real thing had begun that an action was actually in progress.

Shortly our interest was to multiply fourfold when the order to fire our own guns was given. After a time shells beginning to drop

[illegible] I retired to my station, a [illegible] just below water line in the after [illegible] one of the few available places in a ship of this class where [illegible] my party [illegible] men could be accommodated, the other half of the party in charge of the [illegible] steward being stationed at a similar station forward. [illegible] found [illegible] knowledge as to how matters were progressing we had to [illegible] fragments of information [illegible] communication with [illegible] upper deck.

[illegible] from time to time [illegible] shells pitching short and bursting, whose [illegible] did not penetrate the ship's skin. [illegible] who [illegible] at the [illegible] moment to see [illegible] shell entered some [illegible] Commander's [illegible] where [illegible] for this [illegible] Main [illegible] to thank. The [illegible] a similar [illegible] shell [illegible] full head [illegible] its highly [illegible] place [illegible]

[illegible] life [illegible] just [illegible] her—she [illegible] of which [illegible] The sides [illegible] twenty-three holes [illegible] and yet her list [illegible] wounded [illegible] She also [illegible] being torpedoed [illegible] torpedo passing [illegible] from a [illegible]

[illegible] back once or [illegible] station [illegible] that all was correct. [illegible] I should say the [illegible] than a modern [illegible]

The Wounded of the "[illegible]"

It was not till the latter part of the action that I was called upon to deal with any wounded, and then a rapid succession of six [illegible] either helped or managed to walk to the [illegible]

[illegible] the first-aid party [illegible] thus returned to [illegible] in the wardroom temporarily [illegible] first-aid men being [illegible] were treated at the forward [illegible] who had received a somewhat [illegible] fragment [illegible] the eight cases were wounds [illegible] from the ship [illegible] by [illegible] exploding shell [illegible]

[illegible] W[illegible] [illegible] L[illegible]

[illegible] with the [illegible] [illegible] for [illegible] Lae[illegible] [illegible] The L[illegible] [illegible]

Then duly assisted by the [illegible] with steel and [illegible] I spent the next few [illegible] most part in this [illegible] added that at this [illegible] injection to the [illegible] during the night. It was found [illegible] The procedure in detail was as follows:—

(1) Careful [illegible]
(2) Removal [illegible] of clothing, but [illegible]
(3) Thorough washing of [illegible] with warm [illegible] very soapy water.
(4) Douching with warm [illegible]
(5) Douching with bichloride [illegible]
(6) Washing this away [illegible]
(7) Drying the wounds with [illegible]
(8) Reapplication of iodoform [illegible]

In the case of wounds [illegible] cleansed. In the case [illegible] around the wound as well as the [illegible] Shaving where necessary was [illegible]

In the case of burns all [illegible] and hair were removed as for [illegible] such large areas as this [illegible] taps to shoulder as well as the [illegible] chest, arm, and elbow. The [illegible] a small area being dealt with at a time. [illegible] were strips of picric acid [illegible] and masks cut into strips for the face. These were [illegible] pam quickly and the case [illegible] been treated with gloves applied [illegible] process.

Of the total of 27 cases there were [illegible] shell and splinter wounds, 16 of the [illegible] of mines.

The type of wounds were both lacerated and punctured deep or shallow of all shapes and sizes, with several multiple [illegible] raising compound comminuted fractures.

The following were some of the most interesting cases.

(1) A German seaman, a brawny young fellow, suffering much pain and considerable loss of blood from a wound in his left foot. Examination showed the presence of a piece of metal, embedded in the lower part of the tarsus, from underneath which steady oozing of blood was occurring. I put the patient under chloroform, and he was kept lightly under

[illegible] the Paymaster, which [illegible] fragment of [illegible] of loose bone. The [illegible] difficult [illegible] owing to the [illegible] piece of shell [illegible] pointed in all [illegible] embedded in [illegible] so firmly that it [illegible] of a [illegible] eleven or more [illegible] fragment [illegible] its removal gave the [illegible]

[illegible] with multiple [illegible] He complained [illegible] pain in the right [illegible] The humerus was [illegible] Near the [illegible] small clean cut wound [illegible] cause of [illegible] fragment of steel [illegible] patient was much [illegible] and obtained some [illegible]

[illegible] with [illegible] fracture of right radius, ulna and [illegible] to a large wound in [illegible] neighbourhood of [illegible] Multiple [illegible] of face and body [illegible] scalp wound. This [illegible] appeared to be suffering from severe [illegible] at times wandering [illegible] but [illegible] The wound [illegible] scalp was found [illegible] penetrate the skull [illegible] the left frontal [illegible] He died after several days in hospital.

O[illegible] Wounded

(1) A [illegible] recovered [illegible] was born with [illegible] He had [illegible] shaped [illegible] shell wound in [illegible] of right thigh [illegible] passing deeply through the muscles [illegible] was very [illegible] anxious [illegible] to his work which he [illegible] after two or three weeks.

(2) A [illegible] lieutenant [illegible] the line [illegible] which had been [illegible] He had been [illegible] the [illegible] by a piece of shell [illegible] through [illegible] ship [illegible] of the water [illegible] He [illegible] wounded [illegible] the lower right [illegible] He was passing blood [illegible] and a good deal of pain [illegible] He was [illegible] had passed [illegible] type of [illegible] it was [illegible] had been [illegible] and [illegible] that he [illegible] completely [illegible]

[illegible] was rather persistent in several cases where wounds were deep. Dressings required changing [illegible] One case in particular [illegible] A powerful English seaman who [illegible] wound in the middle of his thigh had [illegible] being moved [illegible] position [illegible] and fainted. Dressings which had been freshly put on [illegible] or so previously had suddenly become saturated with blood. Repacking

and bandaging of the wounded appeared to be excellent. Patient was found to have some bandaging material and a small amount of wound

Shock was present in several cases and to be expected from

The conduct and behaviour of the prisoners were admirable. In only one case did I hear any complaint, and this was in one of the less severely injured. Very many small bandages were in consequence wasted, but the prisoners and were evidently taking great trouble to carefully arrange them. Rather a little confusion however was caused at the first moment by the fact of the Germans were at first rather sullen but their confidence was soon gained when they found that I could speak to them in their own language, and that we were quite upon a friendly footing with them.

I found aboard Danish ships several well built useful and acceptable for those who could not walk. At first one or two of the Germans hesitated before accepting what was offered them but they soon thawed and took the proffered gratefully and in fact thought a little later I was personally done for them was remarkable.

I was able to report to the Captain of the Medical Department that all cases had been dealt with as well as lay in my power and made as comfortable as circumstances would allow.

On arrival at Harwich these patients were taken off by Ambulance trains to the various hospitals. Those suffering from the effects of gas were transported to the hospital ship Lusitania. I was engaged in the former cases until about 7 p.m. when I returned to the ship had some food and then had a bath and turned in. Curiously enough although I could not sleep well when on duty I had no difficulty in doing so when off duty but I had passed a very interesting day and night.

I would add that I had put to sea to attend to the wounds of these patients on the ship's surgeon to attend to. I was much gratified some time later to hear from Staff Surgeon Fink that the cases from the Lusitania had progressed remarkably well rather than others received and that this was probably due to the fact that they had received very early and thorough dressing.

WOUNDED TREATED AT THE ROYAL NAVAL HOSPITAL HASLAR

[illegible] WAR [illegible]

[illegible] from the [illegible] of the [illegible] of th[illegible] between [illegible] approach[illegible] form[illegible] whom [illegible] shell. [illegible]

[illegible] all wounds [illegible] where [illegible] tetanus [illegible] raised [illegible] Notes of this case [illegible] pol[illegible] fifty-[illegible]

Cases received from the Naval Action [illegible]

Shell Wound of Head.—[illegible] right upper [illegible] drained by [illegible] at once. [illegible] days there [illegible] formed [illegible] ment removed [illegible] *coli communis* [illegible]

Shell Wound of Arm.—[illegible] tered by bursting shrapnel. [illegible] board, but suspended [illegible] collapsed with tourniquet [illegible] at junction of upper and middle third of humerus. [illegible] well

[illegible] —Penetrating wound of [illegible] collapsed. Pupil [illegible] Vision [illegible] of globe

[illegible] *and Thigh* —Compound comminuted [illegible] Extensive lacerated [illegible] communicating with wound on [illegible] Forearm would freely enlarged shell [illegible] of bone removed. Wound drained [illegible] upwards [illegible] bone, found to [illegible] bone. Limb established Subsequently [illegible] abscess formed behind peritoneal cavity [illegible] Finally [illegible] was performed in transverse [illegible] well

Shell [illegible] —Left [illegible] joint shattered by [illegible] Amputated [illegible] vessels [illegible] Appearances [illegible] Now well

Shell [illegible] Penetrating wound [illegible] situated [illegible] Shell showed [illegible] Wound enlarged [illegible] Wound drained [illegible] Now well

Shell [illegible] Right leg [illegible] Amputation [illegible] joint had been [illegible] through [illegible] wound. Left foot [illegible] shell fragment [illegible] removed. Amputation [illegible] Now well

Bullet [illegible] Left shoulder joint [illegible] by bullet [illegible] Amputation [illegible] Complete [illegible] several [illegible] Stump healthy [illegible] extending [illegible] and [illegible] of [illegible] Brachial plexus [illegible] Six weeks afterwards [illegible] to elbow no return of [illegible]

[illegible]

Shrapnel [illegible] upper jaw [illegible] Several teeth and [illegible] by operation

Shrapnel bullet found fixed in left alveolar plate having passed through upper jaw from right to left Bullet removed Large perforation of hard palate Antisepsis serum given Progressing well

Shrapnel Wound of Neck—Tracheotomy had been performed before admission Two lacerated wounds on left side of neck, one behind angle of jaw leading to the pharynx the other just below body of the jaw leading forwards and downwards to left side of trachea Both wounds septic Skiagram showed shrapnel bullets lying at ends of sinuses Wound tracks opened up and cleansed Both bullets removed that from the lower track being approached from the mouth and removed through the pharyngeal wall Antisepsis injections given Progressing well

Shrapnel Wound of Leg—Compound fracture of left tibia and double fracture of fibula Entrance wound over lower third of tibial crest No exit wound Very septic Wound opened freely, displaced fragments reduced and drainage established by counter opening in back of leg Hectic temperature for some days Wound cleaned gradually and limb subsequently put up in plaster of Paris with Haekenbruch's extension apparatus Antisepsis vaccine given

Shell Wounds of Arm and Face—Comminuted fracture, shaft of right humerus Entrance wound on inner and posterior aspect Exit wound on outer surface 2 in above condyle Lacerated wound right upper eyelid extending inwards to inner angle of orbit, with rupture collapse and considerable chemosis of the globe Skiagram showed shell fragment, which had perforated floor of orbit lying at the back of hard palate Wounds septic Enlarged cleansed and tube drainage established Arm put up in inside rectangular and outside splints Enucleation of eyeball twenty five days after injury, when orbital wound had completely healed No attempt to remove shell fragment Antisepsis vaccine given

Shrapnel Wounds of Knee joint—Admitted with several small penetrating wounds around left knee-joint and a circular sloughing wound on the outer surface of leg 2 in below head of fibula Also burn of second degree below popliteal space Effusion into joint Febrile temperature and pulse Skiagram showed shrapnel bullet embedded in head of tibia close to joint All wounds septic Hectic temperature followed for some days but no local signs of pus in the joint Thorough antiseptic treatment adopted Antisepsis vaccine Progress slow but steady Wounds cleaning and healing Effusion subsiding No attempt to remove bullet Prospect of a good functional joint

A second case occurred in an officer who was shot in the left

knee whilst reconnoitring in a motor car. Entrance wound ½ in. in diameter over the inner tuberosity of the tibia. No exit wound. Several small splinter wounds over upper aspect of leg. Ten days under treatment in a French hospital. Margins and track of wound sloughing. Slight painless effusion into joint. Skiagram revealed bullet lodged in the inter-condylar space and two small metal fragments embedded in ligamentum patellæ. Back splint and antiseptic dressing. Sloughs slow in separating. Effusion quickly subsided. Discharged to complete convalescence at his home, with a painless movable joint.

Shrapnel Wound of Foot.—Penetrating septic wound dorsum of right foot. Comminuted fracture third metatarsal bone, also severe scalp wound, with much loss of tissue but no fracture or erosion of bone. Skiagram showed shell fragment lying on plantar aspect of second metatarsal bone. Removed by plantar incision and through drainage provided.

Shell Wound of Leg.—Compound severely comminuted fracture of left tibia lower third. Entrance and exit wounds bathed in pus. Large suppurating hæmatoma over lower two thirds of anterior and internal aspect of limb. Freely opened, drainage established through wounds and counter opening, and limb splinted. Febrile temperature for several days. All wounds discharged freely. Twelve days subsequently a collection of pus formed over internal malleolus. Opened and drained. Small loose fragments of bone removed. All wounds now healing and good progress is maintained. Antisepsis maintained.

Multiple Shell Wounds—Pneumonia—Death.—Admitted seven days after receipt of injuries. Very ill and weak. Temperature 104, pulse 120. Clean-cut penetrating wound in upper right gluteal region, leading to ilium. Two lacerated wounds in lower left gluteal region communicating with a wound in upper and posterior aspect of thigh. Lacerated contused wound middle of inner aspect of left leg. All wounds septic and showing much contusion and destruction of tissues. Shell fragment protruding from leg wound removed. Skiagram showed shell fragments in right and left buttocks and over sacrum. In addition there were several splinter wounds distributed over back and face. All wounds cleansed and dressed antiseptically. Eighteen hours after admission pneumonia developed and despite all treatment death occurred within thirty-six hours. Trismus was observed twelve hours before death but no true tonic muscular spasm of trunk or limbs.

Antitetanic serum was given. Blood examined, but the tetanus bacillus not isolated.

WOUNDED TREATED AT THE ROYAL NAVAL HOSPITAL PLYMOUTH

By THE MEDICAL OFFICERS

THE work of this hospital only began to assume a special character with the arrival, on the 15th October of the convoy of 953 sick and wounded Belgian officers and men.

Among the cases were upwards of 250 suffering from various medical affections more or less directly connected with the prolonged periods of exposure and fatigue to which the men had been subjected. Thus not less than 133 cases were included under the headings of rheumatism, lumbago and sciatica, whilst about 50 were suffering from bronchitis and other affections of the lungs. A further group of about 150 included a variety of surgical affections and injuries other than those of gunshot wounds, among these were burns and sprains, fractures and ordinary wounds, frequently septic. In the case of the wounded the injuries were in many cases of several weeks' duration.

The wounds caused by rifle bullets and shells numbered about 200, and can be grouped together with those occurring in the English wounded admitted a fortnight later. These formed the bulk of 212 officers and men landed at Plymouth by hospital ship on 29th October and consisted almost exclusively of wounded.

Among these cases the wounds were much more septic than in most instances had received a week or less before their admission. The wounds by bullet and shell in the 212 cases numbered 186 in 182 individuals. Grouping together the wounds in the two series of cases the total is 389.

The following table gives the position and contributory wounds in those produced by rifle bullet and shell, but not septic.

Among the cases in which a bullet had traversed the limb or part of a limb it was frequently noticed that even in the absence of bone or joint injury a considerable degree of stiffness of the part persisted after the wound had healed with limitation of the movements of the neighbouring joints and with a tendency to muscular contracture. This was especially noticeable in bullet wounds of the forearm and leg.

Among the nerves injured were the musculo-spiral median, ulnar, great sciatic, and external popliteal.

In one case of median nerve paralysis the bullet track was

[illegible] one end which admitted a fine probe [illegible] Operating the nerve it was found to be [illegible] dark substance which proved to consist of [illegible] material from clothing incorporated in scar tissue The was dissected away and the nerve set free

BULLET AND SHELL WOUNDS

	RIFLE BULLET		SHELL	
	Healing or healed	Suppurating	Healing or healed	Suppurating
Head	15	3	9	8
Neck	6	1	4	—
Chest	8	2	4	—
Abdomen	2	—	1	1
Back	2	3	5	3
Perinæum	—	1	—	—
Penis	1	—	—	—
Hip buttock, groin (with scrotum 1)	14	2	5	6
Thigh and knee (with scrotum, 3)	23	12	13	9
Leg and ankle	16	10	8	9
Foot and toes	13	7	6	6
Shoulder	12	7	6	5
Arm and elbow	7	5	8	3
Forearm and wrist	17	13	7	1
Hand and fingers	11	24	7	9
Multiple	1	1	—	—
	147	99	83	60
Totals	246		143	

In another case of healed bullet wound of the fore arm, a peculiar spastic condition of the flexors of the fingers and muscles of the thumb was present and there was marked impairment of sensation in the hand and fingers the only definite feature elicited from the patient a Belgian being that the little finger was all right Operation revealed a flat white scar covering the median nerve at the level of the upper border of the pronator teres This was removed and the nerve wrapped in Cargile membrane By the

third day the spastic condition of the hand was less and the patient could voluntarily flex the last joint of the thumb.

Even in cases presenting no obvious evidence of nerve lesion, areas of impaired sensation in the limb were found in several instances, and would probably prove not uncommon if systematically searched for in a series of cases. In the case of an officer who had been shot antero-posteriorly through the middle of the leg there was well marked impairment of sensation on the dorsum of the foot and on the two inner toes. The extensor brevis digitorum was also paralysed, thus suggesting an injury of the anterior tibial nerve.

The remarkable absence of symptoms often observed in cases in which a rifle bullet has traversed important structures is well known. In one Belgian soldier a bullet entered the chest at the level of the ninth rib in the left mid-axillary line, and was removed from beneath the skin over the ninth rib on the right side, at a point rather anterior to that of entry. The bullet must thus have passed through the pleura, liver, stomach, and probably the spleen. No ill results followed, although the occurrence of a rigor, a temperature of 104·4° F., five weeks after the injury, with some rigidity of the right rectus, suggested the possibility of subphrenic suppuration. Three weeks have since elapsed, and the man remains well.

In another case a shrapnel bullet entered the right side of the back of the neck and passing forwards into the lower jaw on the same side, knocked out the wisdom tooth and partially fractured the bone. The bullet was easily removed from the alveolus.

The treatment of suppurating wounds with hydrogen peroxide and iodine baths has been attended with good results, the dressings consisting of cyanide gauze or boric fomentations, according to the profusion of the suppuration and the amount of the surrounding inflammatory swelling. X-ray examination in such cases is very advisable, with the object of detecting the presence of metallic foreign bodies or bone injury. Even when such examination is negative, exploration under an anæsthetic is often advisable, in order to secure free drainage and removal of any fragment of clothing which may be present.

Many of the bullet and shell wounds of hands and fingers were admitted in a very septic state, but the majority rapidly improved with treatment. In the hand the bullet often passes through from dorsum to palm, and the aperture of exit presents an appearance as if the part had been burst open. In such cases X-ray examination has frequently shown comminuted fractures of the metacarpals.

and the appearance of several hands, thus damaged, suggests that healing will be delayed by a varying degree of necrosis. In the case of the fingers amputation may be unavoidable, but in general conservative treatment has been adopted. This has especially applied to those cases in which the ends of two or more fingers had been blown away and septic stumps remained.

The operations performed in connexion with the series of 389 wounds numbered 76, excluding a number of trivial procedures such as the removal of a subcutaneous foreign body. The operations were as follows: exploration and drainage of septic wounds, 15; removal of bullets &c., 11; amputation of fingers, 9; for injury of nerves, 3; suture of tendons, 1; removal of eye, 2; for fracture of skull, 1; for abdominal abscess, 1; ligature of subclavian artery, 1; amputation at shoulder, 1; amputation of thigh, 1.

The amputation of thigh was performed successfully for an intensely infected comminuted fracture of the upper end of the tibia caused by a rifle bullet at short range. The man after being shot had crawled about unhelped for four days.

The amputation at the shoulder, performed on the day of writing, was undertaken for a bullet wound of the axillary artery, with profuse suppuration and followed by gangrene of the limb.

Among the operations performed before admission were amputation of thigh, 2; drainage of suppurating knee-joint, 1; removal of bullets &c., 11; and several amputations of fingers.

Two major operations were successfully performed on board the hospital ship—trephining for gutter fracture, and amputation of the arm for emphysematous gangrene. Except in those cases in which a bullet or fragment of metal could be felt beneath the skin or by probing a wound the presence and position of the foreign body was determined by X-ray examination.

In all 180 cases were examined in the X-ray department. In 93 cases bullets or fragments of metal were found: rifle bullets in 15, shrapnel bullets in 13, and fragments often multiple in 29. In 17 cases fractures were present, and in 30 the absence of bone injury was determined. In one case a rifle bullet had drilled a small hole through the upper end of the tibia. In another case a shrapnel bullet was localized in the base of the right lung and could be seen rising and falling with the diaphragm. The method of localization usually adopted is described by Surgeon Bradbury, R.N., in the present issue of the Journal, p. 40. In cases in which it was particularly important to determine the relation of the foreign

lely to a bone, the stereoscopic or the triangulation method was also used.

In dealing with bullets or metallic fragments localized by X-ray methods, and in the absence of an unhealed wound in the immediate vicinity, the incisions were planned with a due regard to the anatomy of the part and in only three cases was the search abandoned. Two of these were small fragments, and might well have been left alone; in one a shrapnel bullet thought to be lying on the back of the sacrum was found by rectal examination to be lying in front of the bone. Indeed the presence of a bullet, detected only by X-ray examination, in the entire absence of symptoms or disability, and in the absence of an unhealed wound likely to be kept open by it does not necessarily call for an operation.

One fact, often mentioned by others, was frequently noticed—the difficulty of feeling a bullet even a large round shrapnel, in the tissues of the operation wound. This applies particularly to a probe and renders the use of a finger often unavoidable. When a fracture is present particularly if comminuted the difficulty of distinguishing metal from bone has been found to be very great, and in such cases as well as in those in which a metallic fragment is present in a sinus the telephone probe has proved of real utility.

In two cases in which the tract had otherwise healed the retained bullet was found to be lying in a small abscess cavity in one case situated beneath the insertion of the brachialis anticus muscle.

It was frequently noticed that the rifle bullet, before coming to rest in the tissues had turned so that its apex pointed more or less towards the site of entry. In some cases this was doubtless due to contact with a bone but may have been explained, as has been suggested, by the fact that on account of the extremely conical shape of the bullet the centre of gravity is so near the base. It may well be supposed that in some cases, the extensive damage produced at the aperture of exit may be due to the bullet leaving the body broadside on or base first.

Tetanus antitoxin has been very freely used, and no case of tetanus has so far occurred in the hospital.

A SIMPLE METHOD OF LOCALIZING BULLETS

By Surgeon S Bradbury M B D P H R N
Radiographer Royal Naval Hospital Plymouth

After trying various methods of localizing bullets the following has been adopted, and has been in use in this hospital since the outbreak of the war I am indebted to Dr Hernaman-Johnson for the suggestion of using a strip of lead, but I venture to think that the following modification simplifies his method It is applicable to all cases, and does away with the necessity of rotating a badly injured limb through a right angle—an essential in his method—moreover, there are many positions in which the bullet

Fig 1

may be situated where his method does not give the point on the skin nearest to the bullet (see fig 1) Here the surgeon, using Dr Hernaman-Johnson's method would make his incision at point C where is X is the point nearest to the bullet

Fifty four bullets have been localized and in only two cases has there been the least difficulty in finding the bullet on the operating table The part is screened, and the anticathode placed vertically underneath the foreign body Two markers are placed

on the part, one above and one below in line with the bullet These points are marked on the skin (A and B in fig 2) The part is rotated through a few degrees and the process repeated, the points C D being marked A strip of sheet lead about $\frac{1}{8}$ in wide is now moulded to the limb, and the four points A, B, C D marked on the lead The lead strip is then removed from the body or limb and its curve accurately traced, the four points being marked on paper The points A and B, C and D, are joined and the intersection of these lines at F represents the position of the

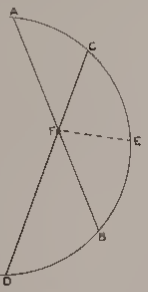

FIG 2

bullet A line is drawn from F to the nearest point E of the curve, which is the point on the skin nearest to the bullet The distance between E and F gives the depth at which the bullet is situated The distance between B or C and E is measured and the point corresponding to E is marked on the skin with silver nitrate

The rotation of the part prior to making the second examination must be done through only a few degrees or otherwise it would be impossible to remove the lead strip without altering its curve

In cases where the surgeon wishes to know the position of the bullet in relation to bone, either the stereoscopic or triangulation method is used in addition to the above

REPORT ON THE TRANSPORT AND TREATMENT OF WOUNDED IN THE HOSPITAL SHIP "PLASSY"

BY FLEET SURGEON M L B RODD, R.N

Two trips were made from Calais to Southampton with Belgian soldiers, and two trips from Dunkirk to Cherbourg with French soldiers 2 023 wounded in all being conveyed by the hospital ship "Plassy"

Some of the wounds were very slight, but the majority were of incredible severity These conditions appear to be caused by the huge number of anaerobic micro-organisms found in the soil The presence of these germs is stated to be due to the intense cultivation of the lands in Belgium and France, which would seem to teem with tetanus, *Bacillus aerogenes capsulatus* and other anaerobic germs In trenches dug out of this soil the soldiers stand for hours and sleep there get their clothing soiled and wet, and consequently the skin of their hands and face Under these circumstances the severity of the wounds and the onset of tetanus, &c is not to be surprised at I was struck with the lack of shock, but there was however, a much lowered vitality This was treated with rest and stimulants brandy and bovril which in some cases were given together The wounded Belgians and French were transported to the base where we received them in ambulance trains These consisted of ordinary horse vans for cot cases They had been cleaned out and fitted with steel uprights, to which were attached steel _____/ shaped supports These supports, as shown in above diagram, exactly and accurately fitted the French Service stretchers so that once on the stretcher the patient was taken to the ambulance train, and thence to base hospital without again being taken off the stretcher This method is to be commended Each van carried eight cots The stretchers were quite simple canvas stretched and attached to wooden poles, strengthened underneath by galvanized iron rods They stood on the ground on four small runners The walking cases were accommodated in the ordinary passenger service A food van, with chef, fire, stove, &c, was attached to the train The splints used were principally of cardboard, but there were some very efficient of wire A considerable number of splints had to be expended on board, especially long Listons and one McIntyre The French first field dressings

were good, and iodine appeared to have been used In some cases the bandages were too tightly applied with disastrous results

I visited the French hospital ship "La Bretagne No ward accommodation was prepared and cabins were used for cot cases The first saloon was fitted with stretchers as cot cases which were prevented from movement when the ship rolled by pieces of wood nailed to the deck, and arranged to exactly fit the legs of the stretcher This commended itself to me as a quick method for a hospital carrier and much movement of the patient was avoided In the centre of the saloon for the patients was an operating table and equipment, which naturally could only be looked upon as an emergency fitting The majority of French soldiers had received antitetanic serum, this fact being noted in each case on a label attached to patient's clothes with the diagnosis &c One case of tetanus in a French soldier occurred on board No injection was given on board nor had he received any before embarking None was given in this ship because he had trismus and pulsations It was then not considered of any value Instead he was treated by injection of morphia and large doses of chloral and bromide He was landed at Cherbourg and sent to a special hospital At this hospital Dr Santz stated the following was the treatment "The sick attacked with tetanus are treated by subcutaneous injections of a solution of phenol in water 2 grm per 100 millilitre (1 per cent)- as soon as possible Two injections of 10 mm (12 drm) are given one in the morning and one in the evening I have never met with any accident If the injections can be given early I prefer to give them in the wounded region In addition patients are given large doses of chloral, and also morphia

The bullet wounds of minor degree had small entrance and exit wounds were scabbed over, aseptic healing rapidly and causing no trouble They had apparently been dressed with iodine and cyanide gauze dressing This scabbing prevents the entrance of micro organisms, efficiently seals the wound and should not be removed Other bullet wounds had caused large wounds of exit and in some cases this appeared to be due to the turning over of the bullet on its long axis thus making a much broader projectile than when pursuing its course in a direct line with its axis Hence there is necessarily much greater resistance offered by the tissues for a larger wound results These bullets coming in direct contact with the bones caused great comminution especially in the skull The bullet wounds of the skull were instructive and interesting for all had signs of paralysis &c, from compression which called

for immediate operation Five operations for this condition were performed on board, *vide* Cases As far as one could judge since they were so short a period on board the operations were successful but with such laceration of brain tissue, after effects such as mental debiliancy, will probably follow All these cases were compound and comminuted fractures. At the entrance wound, the comminuted bone was driven into the brain tissue and in some cases deeply At the exit wound, the comminuted bone was driven outwards

The shrapnel wounds had a fair sized entrance with large exit The entrance wound was irregular undermined and charred, the exit wound very irregular, pushed out with protruding muscles, and with marked ecchymosis spreading from the wounds in all directions The intervening channel between the wounds was irregular, deep, torturous and septic When the bone was struck, great destruction and comminution invariably resulted In the large majority of cases the wounds had been inflicted several days before embarkation and were extremely septic

The sisters and nurses removed all the dressings, or had them loose ready for inspection The medical officers of their respective wards then saw all cases, and either gave them personal attention or issued instructions as to how the cases should be dealt with This method expedited matters, and we were able to give personal attention to all cases, although they were so short a period in the ship As will be learnt from reading the account of the operations performed on board, the general lines of present-day surgery were adopted in the treatment viz opening up wound freely, cutting away septic tissues as far as possible removal of foreign bodies, irrigation and free drainage

We had no opportunity of dealing with the cases in the earlier stages, but I would advocate a rigid antiseptic treatment—shave and thoroughly clean the parts with ether soap and biniodide of mercury Then dry and apply iodine 2 per cent carefully and freely to the wound which should be free from oozing blood An anæsthetic should be given if treatment is at all prolonged Hydrogen peroxide should also be used as large numbers of anaerobic germs are admittedly present in most of these wounds, and by the use of this aerobic antiseptic, the prevention of the growth of these micro-organisms is not only retarded, but entirely stopped I have read Sir Watson Cheyne's paper on treatment of recent wounds, and if opportunity allows, his method with pure carbolic will be used and tested

Two cases of emphysematous gangrene occurred on board The organisms which give rise to this condition are (1) *B aerogenes capsulatus* (2) *Pseudo œdematis maligni* (3) *B coli*, (4) *L œdematis maligni* These cases were believed to be due to *B aerogenes capsulatus* Cultures were taken but no growth was obtained and further investigation could not unfortunately be carried out These emphysematous producing bacilli are due to contamination with road dust, soil, and manure

Morph hydrochlor gr ¼ with atropin sulph gr $\frac{1}{150}$ was given hypodermically before all operations Injections of morphia were used to abate shock and a solution was kept for use 1 mm gr ¼ Bovril and other medical comforts were also largely used

When the patients were being disembarked special notice was taken of the more urgent cases At Southampton these urgent cases were sent to Netley by motor ambulances instead of long distances by train At Cherbourg the same precautions were taken I should like here to acknowledge my appreciation of the most excellent transport arrangements for disembarking the wounded at Southampton, on the first occasion by the military, and the second occasion by the naval authorities There was no delay everything was immediate without hurry and worked very smoothly

EMERGENCY OPERATIONS PERFORMED IN THE HOSPITAL SHIP PRINCESS ON FRENCH AND BELGIAN SOLDIERS DURING OCTOBER AND NOVEMBER 1914

Cases

(1) R C Belgian —Shrapnel wound right arm causing lacerated wound upper third, with fractured humerus Gangrene of forearm and arm Amputation through the shoulder joint Axillary vessels tied first Flaps left open No sutures used to permit recovery of the infiltrated parts Fomentations to the stump

(2) N L, Belgian —Bullet wound Entrance to the outer side of supra orbital ridge left side Passed through the eye causing laceration Exit on the cheek close to the nasal bone Very septic Enucleation left eye Iodine to skin Boracic dressings

(3) I R Belgian —Shrapnel wound right shoulder with laceration of tissues Compound comminuted fracture surgical neck of humerus Gangrene Amputation through the shoulder joint Vessels tied first Edges of flaps approximated by sutures Drainage tube Iodine Gauze dressings

(4) L K, Belgian —Bullet wound left eye Exit on left frontal region Collapse of eye Enucleation Iodine Boracic dressings

(5) I de K Belgian —Shrapnel wound hypogastric region Wound in bladder and adhesions of this viscus to abdominal wall Peritoneal cavity shut off by adhesions Urine very foul and flowing freely through the wound, soaking the dressings Anæsthetic wound explored

Bladder found to contain portion of patient's trousers, which were removed Bladder irrigated Drainage tube placed in bladder Intestines seen but not injured Small wound of small intestine sutured No peritonitis Dressings changed Patient died All urine voided through drainage tube on to abdominal wall

(6) A S Belgian —Shrapnel wound of scrotum with laceration of tissues Wounds enlarged and irrigated Drainage tube and packed with iodoform gauze &c

(7) T H Belgian —Bullet wound of skull Entrance left occipital region Exit left parietal region Operation Signs of compression Head shaved Flap made by incision between two wounds of entrance and exit, and dissected downwards Comminuted fracture at wound of entrance Portions of bone had penetrated deeply into the brain tissue and were all removed Comminuted fracture at exit also The bone, between wound of entrance and exit, removed Blood clot washed away with Hoffmann's forceps and blood clot removed By repeated irrigation with saline and loose brain tissue washed away Drainage tube Flap sewn up

(8) M W, Belgian —Shrapnel wound of left arm with laceration of tissues Wounds enlarged and irrigated Dead tissues cut away Drainage tube Iodoform gauze packing

(9) Unknown Belgian —Bullet wound of head Entrance left occipital region Exit left frontal region Pupils right unequal Pulse becoming lower Tongue pushed to left Unequal pupils Head raised Flap made and dissected down Incision joining the two wounds Communicated depressed fracture of skull at entrance wound and exit Comminuted fracture at exit Loose brain substance which was partly lacerated Brain pulped and wound red in the area Bulging of brain matter which did not pulsate Brain matter opened Large blood clot removed from the posterior cornu and washed away with Hoffmann's forceps Drainage tube Flap sewn up Paralysis left side of body and patient became unconscious when found

(10) D Belgian —Shrapnel wound of left leg Incised laceration Antiseptic dressing was applied and patient transferred to ward Patient died on the second day after admission Wound and the parts around examined Limbs cleansed Incision enlarged and packed Drainage tube inserted to base of the wound Flap sewn up left open to admit fresh dressings Antiseptic dressing renewed as required Post mortem applied on the peritoneal cavity and patient died

(11) I H Belgian —Left branch of supra orbital ridge shot away Much laceration and tissues destroyed Collapse of eye Left eye enucleated Drainage Flap sewn up

(12) T M Belgian —Shrapnel wound of scrotum Right testicle gangrenous Corrected high up Hematoma right thigh, opened and drained

(13) R V Belgian Shrapnel wound left shoulder Much laceration and destruction of tissue Amputation through left shoulder joint Vessels tied first Drainage Flaps sewn up

(14) H O Belgian —Bullet wound left leg Compound comminuted fracture upper one third of tibia with much laceration of tissues Commencing gangrene Stephen Smith's amputation through the left knee joint Drainage

(15) Unknown, Belgian.—Bullet wound of head. Penetrating wound parietal, exit left frontal region. Patient could not speak. Left hemiplegia sided paralysis. Head shaved. Incision commenced, two wounds joined and flap dissected downwards. Fissured fracture of skull upwards and downwards. Comminuted fracture at contusion and exit. Pieces removed. Brain much lacerated and washed away with hot saline. Implicated over the left rolandic area. Dura protruded but did not pulsate. Laceration incised and large blood clot washed away. Drainage. Flaps sewn up. Good progress when patient was lauded.

(16) Unknown, Belgian.—Bullet wound left parietal region. Hemiplegia Jacksonian epilepsy. Compound comminuted fracture. Wound opened up by flap incision. Comminuted bone removed. Lacerated brain washed away. Blood clot removed. Dura opened and sewn up. Drainage. Flaps sewn up.

(17) Unknown, Belgian.—Bullet wound through right orbit. Exit on cheek. Eye collapsed. Chemosis. Right eye enucleated. Boric dressings.

(18) Unknown Belgian.—Bullet wound causing a compound comminuted fracture of the right humerus at the surgical neck. Commencing gangrene. Amputation through the right shoulder joint. Vessels tied first. Drainage. Flaps sewn up.

(19) A. F., French.—Shrapnel wound compound comminuted fracture lower one third left thigh with deep wound much laceration and commencing gangrene. Amputation through the upper one third of thigh by a long internal and short external flap. This operation was performed with these flaps being the only method of obtaining healthy skin. Drainage. Flaps sewn up.

(20) A. C., French.—Shrapnel wound left leg. Entrance wound middle one third inner side passed upwards and outwards crushing lacerated wound on the outer side. Wounds enlarged, opened up and scraped. Dead tissue cut away. Piece of shrapnel removed size of two shilling piece very irregular to which was attached a piece of soiled flannel evidently from patient's pants. Drainage tube through both wounds. Iodoform gauze packing.

(21) C. P., French.—Bullet wound left knee, with comminuted fracture of patella. Knee joint freely opened, irrigated and drained. The case was very septic and urgent.

(22) M. L., French.—Compound comminuted fracture right ulna from bullet wound. Much laceration of tissues. Commencing gangrene. Amputation lower one third right femur by long anterior and short posterior flaps. Drainage.

(23) E. P., French.—Shrapnel wound left thigh septic, small wound inner side, large wound on outer side lower third. Good deal of ecchymosis. Both wounds opened up. Scraped. Dead tissue cut away. Piece of shrapnel removed with portion of shirt attached. Shrapnel had caused roughening of the periosteum on the anterior surface having grazed the bone without fracturing. Drainage tube through both wounds. Packed iodoform gauze.

(24) I. L., French.—Shrapnel wound right buttock, septic, opened up. Shrapnel removed. Scraped. Drainage. Iodoform gauze packing.

(25) A. C., French.—Shrapnel wounds left leg and thigh. Opened up and scraped. Drainage. Iodoform gauze packing, &c.

(26) Z B French —Bullet wound right leg, septic, incised, scraped, dead tissue cut away Drainage Iodoform gauze packing &c

(27) V C French —Bullet wound compound and comminuted fracture right humerus, with commencing gangrene Spence's operation through the right shoulder joint Vessels followed down with assistant's hands after disarticulation flaps cut and vessels ligatured Flaps sewn up Drainage

(28) I C French —Shrapnel wound middle one third right thigh Compound, comminuted fracture Parts much lacerated Wounds opened up Comminuted bone removed Pieces of dead tissue cut away with scissors Iodine Drainage Iodoform gauze packing Long Liston splint

(29) E V French —Bullet wound of head Entrance left occipital region near the middle line exit left parietal Paralysis right side Spastic paralysis left side Head shaved Curved incision by joining the two wounds, and flap dissected downwards Comminuted portions of bones removed Much laceration of brain tissue Bone nibbled away with Hoffmann's forceps Dura mater opened, and much blood clot removed Superior longitudinal sinus had been wounded, which probably caused the left spastic paralysis due to blood clot finding its way into right side of brain Drainage Flaps sewn up

(30) L G French —Shrapnel wound, septic, of right shoulder Entrance small at apex of acromion process exit in axilla very large lacerated and gangrenous wound Both wounds enlarged and opened up comminuted acromion removed Dead and gangrenous tissue cut away in axilla Large drainage tube passed through both wounds Packed with iodoform gauze Arm placed in angular splint

(31) D A French —Shrapnel wound right knee comminution of patella Opened up and drained Gangrenous and emphysematous thigh Too far gone for amputation Free incisions made

(32) L T French —Bullet wound left foot and leg Much lacerated Lymphy-scirrhous gangrene rapidly spreading in the thigh to upper third Amputation through the right hip joint Patient much collapsed Head kept low, and infused with brandy and saline *per rectum* He died five hours after operation from shock Furneaux Jordon's method of amputation was performed Drainage Flaps sewn up

TYPHOID AND ITS PREVENTION

By Fleet Surgeon P W Bassett-Smith C B R.N

It was in 1829 that Louis first applied the term typhoid to fever which had previously been known as 'slow nervous fever' and *fothienenterite*. This disease was for some time not differentiated from typhus and the same confusion of the two fevers is nominally continued on the Continent, for the term typhus is still used by some of our French colleagues to designate what we know as typhoid the former disease being called "epidemic typhus," in contradistinction to typhoid while to the ordinary man the difficulties are increased by the introduction of the name enteric. Hence frequently in practice the question is asked "What is the difference between typhoid and enteric?" Most people however, understand that typhoid is a common cause of much sickness and death, mostly in the autumn months at home that it is very prevalent everywhere abroad and that in time of war epidemics are particularly prone to occur. Those who have had friends or relations serving in India, or have recollections of the Boer War, generally thoroughly understand the danger of the disease.

For many years we were brought up to believe that the contagion of the disease was introduced by water and milk, and that general conditions of bad sanitation favoured the spread of the fever. With this knowledge energetic measures were taken by all those responsible for the public health always resulting in a great reduction of the incidence of the fever, but still there remained many very puzzling epidemics in which no cause could be traced. In India another factor was soon recognized as being a very powerful means of distributing the disease, namely, the contamination of food through the agency of flies and endeavours were made to combat this source of infection by protecting all articles used for food by fly proof coverings. The possibility of flies settling on typhoid excreta, and acting as passive carriers of the typhoid germs, was also brought very prominently forward during the South African War for where large bodies of troops were constantly infecting places which were frequently again used as standing camps, the soil became badly contaminated and thus with the warmth of the climate and lack of sufficient water supply intensified the danger. But there are other factors which are becoming more and more recognized, and which are able to explain

[illegible] for which [illegible] direct contagion [illegible] single individual [illegible] health, or infection from [illegible] typhoid, recognized as such

[illegible] bacteriological investigation of the [illegible] typhoid has shown that the [illegible] during part of its course at least and that the [illegible] is present in the blood, fæces, urine, and other secretions and excretions including the sweat, milk, and even sputum. The importance, then, of isolation and disinfection of individual [illegible] and scrupulous cleanliness of those attending on them is therefore very evident. Pathological research has demonstrated that many of the internal organs are highly infected: the spleen, kidneys, mesenteric glands, and particularly the gall-bladder. When the organism once becomes, so to speak, acclimatized to the last position, the bile remains infected for very long periods, continuously or intermittently discharging active bacilli into the intestinal tract, and thus for many years causing the subjects to be a danger of infection to those with whom they associate. Again, when the kidneys or urinary tract are affected the condition of "bacilluria" or "typhouria" may become established. These cases are known as "carriers" and may be active agents of dissemination of the infecting organism continuously or intermittently. It has been shown that from 1 to 3 per cent of convalescents from typhoid are "carriers" for a longer or shorter period, and that when the gall-bladder is infected the condition is most intractable. LEDINGHAM of the Lister Institute, London, has shown how by bacteriological examinations it is easy to detect the occurrence of these sources of infection, and both in England and abroad there are numerous examples of the frequency with which these "carrier" cases have started epidemics. In our own Service a very excellent example has lately been brought to light in which a ship had constantly recurring isolated cases. No cause could be found in water or food, and a "carrier" was suspected. By a careful examination of the blood for Widal's reaction and by a systematic testing of the stools of those giving a positive reaction, the individual was at last traced; investigation proved that this man, who had suffered from typhoid ten years previously, had infected men in every ship in which he had been stationed. A man in Portsmouth Dockyard was also known to be a "carrier" for many years, but

fortunately, as far as I know, without spreading the disease. As the condition is so persistent, and as it is impossible to keep carriers indefinitely in hospital, it is of the utmost importance that they shall be made to thoroughly understand by often repeated and patient explanations the danger they are to others, and the necessity for absolute cleanliness with a view to avoidance of infecting food. The known cases are, however, relatively few, and every late convalescent from typhoid should therefore be bacteriologically examined before discharge from hospital, and even then looked upon as a potential source of infection.

In all standing camps, and with troops at war when in the unfortunate circumstances which must produce fæcal infection of the soil, and where sanitation, as carried out in happier circumstances cannot be enforced, it is imperative that some other method of protection shall be used. This we have in the prophylactic inoculation of all or as many as possible of those who have to run this risk. Already much has been written, and pamphlets have been freely disseminated by the Research Defence Society and other kindred associations containing abundant statistics which show the frightful prevalence and mortality of typhoid during war, this disease causing a higher death rate in all modern wars than the enemy. Whether such statistics will be repeated in the present conflict of nations time alone will prove, but the serious outbreak in Belgium which has recently been reported emphasizes the danger that awaits all who may be engaged in the land campaign. It is unnecessary to give the history of the protective inoculation method now practised, but it is well known that in England, at least it owes its origin to Sir A. Wright, and the persistency with which he and Sir W. Leishman have gradually brought the procedure into almost popular recognition.

The rationale may be shortly stated thus. Every antigen (or infecting organism) calls forth the production of protective substances in the blood, which are known as antibodies. In the case of typhoid, if the living organism gains entrance to the body it multiplies and causes the disease, but in time sufficient antibodies are produced (in favourable cases) to bring about a cure, although the protective bodies are produced too slowly to prevent the development of the fever. If a healthy person is inoculated with a vaccine prepared from the dead bodies of the germ and their products the antibody is produced, and is able to bring about the destruction of any living typhoid germs which may be accidentally ingested thus after inoculation the organisms being dead do not multiply, but they do cause the antibody to be elaborated for use, and this

[illegible] an immunity which may continue for eighteen months or two years. The present war will be a very crucial test of its value.

The vaccine as used in England is one prepared from a strain which is not very toxic. It is sterilized by heating at 53° C. for one hour (previously to Sir W. Leishman's valuable investigation, it was often overheated and its value more or less lost), standardized, treated with 0·25 per cent. lysol, and bottled for use or put up in capsules. Two injections are required, one of 500 million and one, eight to ten days after, of 1000 million. Several precautions are necessary, and if these are carried out the percentage of unpleasant reactions is very small. The patient should be healthy at the time; he must not take alcohol for twenty-four hours before or after the inoculation; and the operation ought to be followed by at least twenty-four hours' rest. It is, I believe, best to inject the vaccine into the subcutaneous tissue of the pectoral region after having thoroughly sterilized the skin with tincture of iodine. The injection should be given not earlier than 4 p.m. The patient should then return home, have a light dinner, and go to bed. In the case of ordinary troops they should be allowed forty-eight hours' stand off after inoculation.

Generally an erythematous condition or flushing round the site of puncture quickly appears, and a feeling of soreness or sensation like that of a bruise may be complained of for twenty-four to forty-eight hours; occasionally a stiffness of arm or neck may follow. General symptoms may consist of faintness, lassitude, slight headache, or very mild pyrexia; by the following morning the patient may feel quite well, but should remain quiet for the day. For statistical purposes it is advantageous to employ a single vaccine, either that prepared at St. Mary's Hospital under Sir A. Wright or that of Sir W. Leishman; the strain of organism is known, the method of preparation is above suspicion, and the results can be compared.

It is stated by Sir W. Leishman that typhoid, which used to cause 300 to 600 deaths per year, was last year only responsible for twenty cases in the British Army, and that this was due to the general recognition of the value of the inoculation, since practically all men come forward willingly for the treatment. In the report of the Anti-typhoid Committee, a most careful inquiry about 19,314 soldiers, whose average period of service abroad was twenty months, gave the following results: 10,378 were inoculated, and these had a case incidence of 5·39 per 1,000; 8,936 were not inoculated, and the case incidence among them was 30·4. In America prophylactic treatment was voluntary from 1909 to 1911, but at the

latter date it was made compulsory. In that army the following figures given in Sir W. Osler's late paper attest to the great value of the inoculations:

	Whole army		Vaccinated	
	Mean strength	Cases	Deaths	Cases	Deaths
1907	62,523	237	19		
1908	74,692	239	24		
1909	84 077	282	22	1	0
1910	81 134	198	14	7	0
1911	82 800	70	8	11	0
1912	88 400	27	4	8	0
1913	90 645	3	0	1	0

This shows that apart from vaccination there has been an enormous reduction of cases, but the great value of the prophylactic treatment is very apparent.

In France the results are equally satisfactory. Dopter in the French reports for 1913 notes that several forms of vaccine are being used all giving excellent results:—

(1) Heated vaccines of CHANTEMESSE are used in most cases for the military troops and for all the marine. He gives the following interesting table of results.

	Forces	Cases per 1,000	Deaths per 1,000
In Algeria and Tunis—			
Vaccinated	1 699	0	0
Non vaccinated	19 504	14 16	2 16
In Morocco—			
Vaccinated	239	0	0
Non vaccinated	6 295	16 84	21 13
In France—			
Vaccinated	706	0	0
Non vaccinated	35 054	1 25	0
In the Navies—			
Vaccinated	4,698	0	0
Non vaccinated	66,254	8 7	0 6

In the civil population the results following vaccination have also been very satisfactory, often stopping epidemics in their evolution.

(2) With VINCENT'S polyvalent bacillary vaccine the results have been most convincing. In an epidemic at Montauban (1913) which attacked both civil and military there were fifty eight cases and sixteen deaths registered per week. Three thousand soldiers who arrived in this infected centre both old and young protected by inoculation, remained immune, but the disease continued in the civil population. In a gravely infected area in Morocco when the

incidence among the non-inoculated was 169 per 1 000 none among the inoculated troops contracted the disease A law has now been passed in France making inoculation compulsory at the discretion of the medical officer

(3) Besredka, who employs a living sensitized vaccine found in a well conducted experiment on certain regiments complete immunity among those treated with his preparation, almost complete immunity amongst those treated with heated vaccine and a high incidence of typhoid among the non inoculated This method of using living vaccines is unlikely to be employed in our own forces though Besredka found in cases so treated no examples of living organisms in the fæces of those that were examined Still there is a possible danger, and in view of the good results obtained with killed vaccines, there is no great object in incurring the risks attendant on the use of living vaccines

The great advantage of protective inoculation, of whatever kind is therefore evident but with such a powerful agent for good there must be occasional unpleasant or serious results these are possibly due to particular idiosyncrasies of the patients want of care in administration contaminated vaccines, abuse of alcohol or want of necessary care after the inoculation Of the many thousands who have lately been treated instances of unfortunate results are very rare These are moderate local jaundice articular pains syncope septic abscesses, pneumonia, and very rarely cases have been noted of the development of an attack of true typhoid fever, even after the second injection In these last there is always the probability that the inoculations were given during the incubation period Such cases, of course, in the popular mind are certain to be put down to the inoculation and are distinctly unfortunate but the patient himself is not likely to be rendered any worse by the inoculations for as a therapeutic agent, these vaccines have been used at times with marked benefit even in large doses We have however not sufficient experience yet to say which is the best kind of vaccine to be employed or in what dose it should be given

Occasionally questions are asked If the second dose has been delayed over the ten day interval is it safe to give another and after how long an interval? We may reassure the inquirer by saying, that there is practically no danger but that after a long interval of one to two months it is probably wise to commence again with a small dose and give the full 1 000 million or third dose after ten days being guided by the agglutination reaction as an index of the immunity conferred

THE FLYING SERVICE FROM A MEDICAL POINT OF VIEW[1]

[redacted] HARDY V WELLS [redacted]

Great advances have been made both in the skill [redacted] and in the [redacted] during the past twelve [redacted] The speed of aeroplanes has greatly increased chiefly [redacted] engine power but partly also due to the design [redacted] that the aeroplane of to-day is a much safer machine than that of twelve months ago Faulty designs have been [redacted] eliminated and the aeroplane much strengthened Formerly many of the aeroplane accidents were caused by the collapse of some portion usually the wings and chiefly in monoplanes This seems to be a quite rare occurrence now, the accidents that occur being as far as can be gathered from inquiry, due chiefly to air conditions placing the aeroplane out of control or to some error on the part of the pilot Both these causes apparently will remain but the increased speed now available counteracts the loss of control from the former cause Errors on the part of the pilot will probably be further guarded against to a certain extent by reliable instruments which will show the flying state of the aeroplane and so avoid a dangerous condition

High Velocity Accidents.—With an increased speed of aeroplanes now in many machines up to seventy miles per hour the crushing effect on striking earth nose first will be very great and will demolish a great part of the aeroplane even from a very little height Cases occur where the pilot has not been crushed but has been seriously injured by apparently hitting a part of the machine due to the forward velocity of his body when the aeroplane strikes on its nose and suddenly stops These accidents occur only in aeroplanes that have the engine in front and the pilot well behind (such as all modern tractor biplanes and monoplanes) The engine takes the shock and the portion of the aeroplane directly behind the engine (where the passenger seat usually is) crumples up while the pilot's seat &c which is behind, may suffer comparatively little damage It is usually the pilot's head

[1] This article was written in 1915 when Staff Surgeon H V Wells was in medical charge at East Fortune Flying School He is now serving in France.—[Ed.]

that suffers. His body upper part is thrown forward, owing either to a safety belt or to the pilot's unattached while the head bends forcibly forward on the neck. The result is usually that the head strikes some portion of the machine and is injured or the neck is forcibly wrenched. No such injury has actually occurred at the Royal Naval Flying School but an incident of this description did happen. The pilot at the moment of starting put his hand out in front of him against a wooden wind screen which broke and his hand and arm went through it. His head went violently forward, just failing to hit the screen in front and he suffered from some pain and stiffness in the neck for a day or two afterwards. He was wearing a belt. The injuries reported in such accidents seem to be chiefly injuries of the skull due to actually striking, but in one case the only injury found was a fracture or dislocation of the neck. In the case which happened at Brooklands when an officer was killed on the accident to the Martinsyde monoplane the pilot, although wearing a belt was shot almost out of the belt and received head injuries by striking some portion of the machine in front. This was the only injury. It has been suggested that in this accident the head injuries were due to the chin striking first. Here is a possible solution of this and similar cases, but I venture to think that owing to the head being inclined forward the forehead or vertex sustains the striking blow. There are two ways to avoid this: one is a safety belt having shoulder straps to keep the body from being propelled upwards and forwards. This would be unpopular with pilots and would give trouble in releasing before landing. A second and better solution would be to have some giving material in the position in front of the pilot where the head would strike. This could not be a raised cushion or pad, as it would obstruct view and would increase resistance, a thing the makers would not favour. The giving material would have to be on a level with the existing structure. I have examined a number of various types of tractor machines and I think the scheme could be carried out in most machines. If as it seems possible serious injuries to the neck may occur through a forcible bending forward only of the head on the neck shoulder straps appear to be the sole solution.

Safety Belts in Aeroplanes.—The question of safety belts in aeroplanes, e.g. some means of strapping the pilot in his seat, has been much discussed in the last year. Most pilots are in favour of such and do wear belts but a few are averse to them. I have heard several well-known and experienced pilots in discussing the

[illegible] belts, say that they object to them because if the machine crashes to earth suddenly the pilot may be [illegible] in his seat when the machine turns over, whereas if he has no belt, and the aeroplane turns over on the ground the worst that can happen is that he is thrown out. Also, if strapped in he probably could not clear himself if the aeroplane caught fire after a smash and quick releasing devices do not always act. The question of belts I have considered carefully, and have come to the conclusion that a safety belt is a very necessary thing for the following reasons —

At times, in flying, air conditions are met with which may unseat the pilot. Unseating may not throw him out, but it will cause him to lose hold of his controls for the time being, which in itself is a serious danger. This frequently happens while flying in strong gusty winds and also occurs on calm days when an aeroplane comes suddenly from calm to a disturbed local condition. The pilot is then caught unawares; his feet which are resting against the steering bar easily come off that, and thus rudder direction is lost. Moreover he may be thrown forward on the elevator control, and pushing this forward suddenly may cause a dangerously steep dive. I witnessed at the flying ground, last summer, an accident by which a pilot was nearly thrown out. A naval officer pilot while descending from about 500 ft. in an ordinary volplane glide got into a disturbed air patch and was thrown bodily forward. His foot coming off the rudder, he was thrown against the control which was pushed forward and so the machine was placed at a dangerous diving angle. Only by holding on to the wheel control was he saved from being thrown right out, and when the machine was about 70 ft. up it luckily recovered itself before the pilot had time to get back to his seat and regain control. I went to the aeroplane after it landed, and the pilot said he was not using a belt but was only kept from being thrown out by holding tightly to the wheel control.

Of course it is well known that the disturbed air conditions due to rising air currents and gusts exist chiefly close to the ground— at all events, not above 1,500 ft. to 2,000 ft. Above that the air conditions are more steady; therefore it is the atmospheric disturbances met with in the lower area through which an aeroplane must ascend or, more important, descend, that require to be guarded against.

Now against the safety belt is the danger that when the occupants of an aeroplane are strapped in they will in all probability be crushed should the machine roll over on touching ground at a

bad landing, or landing on bad ground. I know of several cases where, if the occupants had been strapped in, they most certainly would have been crushed owing to the capsizing of the machine in the case of an accident at Queenborough the aeroplane turned over and over and was completely demolished. The occupants, although seriously hurt by being thrown out, were saved death.

There is a good deal to be said on both sides of this question, but the objection to belts can, I think, be easily overcome by devising a release which can be readily used just before a landing is made. The present type, where the release pin is on the belt and releases the belt from the body is not reliable or easy to manipulate when the pilot is busy, his attention being taken up with working controls, engine &c. for landing. A lever on the side of the machine by the pilot's side, which releases the belt from its attachment to the seat, is, I think, a more suitable, more convenient, and quicker arrangement. The belt must be fairly broad and comfortable and have elastic or such other means for giving springiness. Its attachment to the aeroplane must be very carefully adjusted so that all freeing devices can clear. A case happened recently when an aeroplane capsized on a forced landing just outside the flying ground, the pilot was found unhurt, but suspended face down, owing to the quick-release device failing, the buckles of which were not able to clear owing to being fitted faultily in the aeroplane.

Safety Helmets.—Whether these should be worn or not is also a matter for discussion amongst aeroplane pilots. The objections put forward against helmets are that they are uncomfortable, and would not save the head from a fall except from the smallest of heights. If one falls on any other part of the helmet but the actual top of the crown, the additional height of the crown would force the head backward or forward and so break the neck. Also, if wearing one in a tractor machine the added propeller draught beating on a high-crowned helmet forces the head back in a most uncomfortable manner. In favour of helmets it can be stated that they are quite comfortable if a proper size is used, that in a ground smash they protect the head from a blow of broken spars, that if the pilot is thrown out, and his head hits a wire, they save a scalp wound, and that the earflaps save damage to the ears. Moreover, if he is thrown on to the ground the helmet would save injury to the scalp, and possibly a fracture of the vertex or the base of the skull. All the above would be, of course, in the case of an aeroplane smashed on actually landing. Everything seems to favour helmets

being worn [illegible] and in the modern [illegible] good deal from the propeller draught A [illegible] pilots just now is a leather skull cap with ear protection pads such as is worn by the racing motorist The ideal helmet, no doubt, would be one that took its support from the shoulders but it would be rather cumbersome and would [illegible] the wearer and so be rather unpopular The question of what type of helmet is most suitable is now under consideration

Clothing —As a protection from cold lined leather jackets are generally worn with, in cold weather [illegible] sweaters (woollen) under neath The Admiralty now issue a leather lined coat and trousers —these are light and serviceable The hands are shielded by lined leather gauntlet gloves Aeroplaning even in cold weather, seems to cause very few chills on the abdomen or chest probably because pilots take the precautions of being adequately clothed The only cases of chills can usually be traced to inadequate protection Modern aeroplanes with their protecting screens are more comfortable for the pilot

Physical Requirements of Candidates for the Flying Service — The candidate must be physically fit and I would reject the anaemic type Particular attention must be paid to eyesight Full normal vision and colour vision is required Hearing must be good The teeth ought to be in good condition Weight does not matter

Age —It is not possible at present to lay down any hard and fast rule as to age My opinion is that the age for selection is between 20 and 30 years Over the age of 30 is I think too old to begin to learn flying with a view to being a Service pilot eg to take up a flying career and fly under all conditions

Type —This I have studied carefully but have come to no conclusion The active type the man who is keen on such things as motoring motor bicycling riding, hunting the exciting sports with an element of danger seem to make the best pilots

Sight —Full normal vision is important for all aeroplane pilots and all candidates should be carefully examined for vision This full vision is important for landing an aeroplane because the machine diving towards earth at an angle, is then turned up or what is called "flattened out" at the right moment for landing This right moment is at a certain distance from earth which the pilot must gauge If he turns up too soon the aeroplane drops from a height and probably smashes if he turns up too late he dives into the earth and wrecks the machine The accidents on

landing [illegible] in the majority of instances, probably due [illegible] judgment on the part of the pilot but that error, I think [illegible] cases is due to defective vision, although so far there is no proof of this Two well known private aeroplane pilots have defective vision corrected by glasses This seems to serve them well especially as they can have their glasses fitted as goggles instead of wearing the usual plain glass goggles but there is always the possibility of the glasses or goggles getting shifted or covered with oil (in the engine-in-front type of aeroplane) This does not affect the normal vision pilot who pushes the goggles up or down out of the way Good vision is also needed in looking for a suitable field for landing when a forced landing has to be made due to engine trouble or other defect

Hearing —This must be good, as any engine defect in the air gives first indication by sound Failure to instantly detect, by hearing, any engine defect may lead to serious accident while flying

Effects of Aeroplane Flying on the Pilot —During the previous year an attempt was made to find out if the pulse-rate and blood pressure were affected This was continued during the early part of 1913 but the results were most unsatisfactory from a research point of view In some cases the pulse-rate showed an increase after only a short flight in calm weather while in others the rate remained normal After a flight in bad weather conditions the pulse-rate was always increased This was to be expected because to keep the machine on a level means an expenditure of muscular energy In the case of passengers the pulse-rate showed very little difference, except, of course those passengers who were making their first flights and suffered a little from nervous excitement Nearly all the cigarette smokers seem to have an increase of pulse-rate and as a great number of aviators are cigarette smokers, one can expect some increase in pulse rate after flying As regards blood pressure the only way to get any definite results seems to be to send the subject up in the air with a recording blood pressure apparatus but unfortunately the vibrations of the machine, due to the engine affect all pressure recording instruments, and the results are very doubtful I think as machines improve it may be possible to carry out such experiments, and obtain some definite data

Editorial.

It may be of interest if here in the first quarterly number a brief outline is given of the origin and scope of THE JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE and a few observations as to its subsidiary policy

Of late years the publication of a professional Journal has been widely discussed, and a majority of officers has felt that if originated, such a Journal would meet with success and would obtain the support of the Medical Service in general Sir James Porter K C B , late Director General, was strongly of this opinion and to him falls the credit of the original recommendation on this subject Then, during the past year Sir Arthur W May K C B Director General, initiated and submitted a scheme for the establishment of the Journal, which was at once approved by the Board of Admiralty Various preliminary details had already been settled towards the end of July, 1914, and some progress had been made in collecting material for the first quarterly number but the outbreak of War which entailed a great increase of work at the Medical Department, necessitated a postponement However, in view of the high importance of such a publication to the Service at present, it was decided on the 16th November to resume preparations, and to issue the Journal in January 1915 At that time departmental work in connection with the War was still at high pressure, and even now is little if at all reduced We ask our readers, therefore, to make allowances for such deficiencies as may appear, though at the same time helpful criticism is invited It may be mentioned that it is intended in the future to increase the scope and character of the Journal as far as finance permits

It is well known amongst medical officers that much of the scientific and medical material in their official reports and other papers some of which deserved wide publication has been unavoidably wasted in former times It was the custom to publish annually in the Appendix of the Health of the Navy, a few only of those original communications which were of most interest to the Service, but now that our Journal is available many of the articles hitherto relegated to obscurity will have the publicity and recognition to which they are entitled It is hoped that contributions will be received from all ranks of the Service, junior as well as senior

[illegible] time to time and to [illegible] latest medical notes [illegible] Service news and correspondence Under the last heading, space might be found for queries as to the course of treatment to be adopted in particular circumstances as well as discussion under pseudonyms In general however, the Journal will be conducted on the lines of the present issue

With regard to the management, we may quote the terms of the recent circular letter from the Director General—'Adequate support is absolutely essential to success It is confidently expected that such support will be forthcoming and that all will unite in the endeavour to promote a publication worthy of the Royal Navy' It is obvious that if the Journal continues to receive literary as well as financial support, its success is assured

The Naval Medical Supplemental Fund

The subsidiary policy will be to foster by every means such associations as The Royal Navy Medical Club and the Naval Medical Supplemental Fund

It is possible that some medical officers may still be unaware of the history and objects of this Fund Founded in 1817, it is administered for the benefit of orphans of deceased subscribers by a Court of Directors the President of which is the Secretary to the Admiralty Subscription was compulsory for all medical officers up to the year 1862 but since then few have joined, and the benefits are practically confined to orphans of members who entered the Service prior to 1861, now a small and diminishing number In January, 1913 it was proposed to affiliate the Fund to the Royal Navy Medical Club, which body was prepared to undertake its administration with provisos that the Fund be distinct from the Club the subscription be reduced to 21s per annum if possible and that the benefits be extended to the widows of all subscribers The Court of Directors was approached, and was in favour of this arrangement Progress towards transference of the Fund has now reached the stage of Parliament repeal of the original Act being necessary When this materialises, the Fund now about £10 600 in Consols, should form the basis of a sound and popular insurance scheme

Clinical and Practical Notes.

NOTE ON A TYPHOID CARRIER

By SURGEON SHELDON F. DUDLEY, R.N.

BETWEEN April 1911 and March, 1914 H.M.S. "Formidable" (1st) serving in the Home Fleet returned twenty-nine cases of typhoid fever, at a time when other ships were remarkably free from the disease. These cases occurred singly and at irregular intervals. They arose in communities in several different parts of the ship, and at various periods. The drainage, water and food supply were, after an exhaustive investigation, found to be above suspicion. Ships serving under identically the same conditions returned clean sheets as regards enteric fever. Practically the only other possible cause of the epidemic in the "Formidable" was the presence of a carrier in the ship. She was free from enteric before April, 1911, therefore this carrier must have served in her after that date, or, assuming the earlier cases to have had some other origin, the carrier might have been one of the original cases of typhoid who had apparently cured to the ship.

These facts reduced the search to those who were serving in the vessel before April, 1911, and to those who had had enteric fever while serving in her, about fifty men in all. The blood of each of these men was tested for agglutination against *Bacillus typhosus*, and their urine and fæces were bacteriologically examined for *B. typhosus*. No *B. typhosus* was isolated from any of their excreta at the first investigation, but one man gave a marked positive Widal reaction. He was re-examined three times, and it was only on the third re-examination that *B. typhosus* was isolated from his fæces.

This case had the following history. During October, 1898, he was sent to the Royal Naval Hospital, Chatham, suffering from enteric fever. In 1899 he had dysentery in China, but no other illness since then. He is a strongly built, big man, 39 years old. He has no signs or symptoms of gall-bladder disease or any other trouble. His rating in the Navy was ship's cooper, and his work therefore, brought him in contact with articles of food when opening casks and cases to assist the ship's steward in serving out these rations to the crew. To the table below is a list of ships to which he served, the date on which he joined each, and the cases of enteric fever (diagnosed definitely as such) that occurred. This list is compiled from an examination of the medical journals of the ships. Fatal cases (when the result is mentioned in the journal) have also been noted in the table. The cases were, of course, distributed amongst many hospitals all over the world; hence this table is probably very incomplete in regard to deaths, and it is more than likely also that the actual number of enteries is underestimated; cases of enteric fever may have been missed amongst such entries as simple continued fever and pyrexia.

With regard to the twelve cases returned by the "Pembroke" during the time this carrier was in the naval barracks, two are noted as occurring actually in the barracks, and no history of the infection could be obtained

[illegible] however were [illegible] I have not detected [illegible] of leave. All the other cases since 1902 occurred at [illegible] the rest of the Fleet was remarkably free from this disease, [illegible] infection could be discovered.

[illegible]	Date [illegible]	Place where serving	Cases of typhoid	Noted in ship's journal as having died
[illegible]	June [illegible] 1878	Home	—	
Orlando	Feb. 15 1899	China	2	
Pembroke	July [illegible] 1902	Home	5 (12)	—
Immortalité	Aug. 27 1903		1	1
Endymion	Jan. 18 1905		1	1
Albion	May 8 1906	Channel	1	—
Majestic	Jul. [illegible] 1907	Home	2	—
Venerable	Jan. 7 1908	Channel	4	—
Implacable	Feb. 2 1909	Atlantic	6	—
Pembroke	April 1 1910	Home	2	—
Cæsar	June 7 1910	„	1	
Formidable	April 1 1911	„	28	7
			53	11

The four cases of enteric fever in the "Venerable" in 1908 appeared on the following dates (1) January 9 1908 (2) January 31 1908, (3) July 23, 1908 (4) December 14 1908.

The medical officer of this ship writing at the time, notes that Case (3) had not been ashore for one month, and that Case (4) had not been on leave for two months. Six cases were reported from the "Implacable" in 1909 when there were two cases only of enteric fever in the rest of the Atlantic Fleet, whose average strength for that year was 9,020 men. In his journal for 1909 the Fleet Surgeon of the "Implacable" wrote "I have tried to trace how these men got the disease but failed. It is quite possible there may be a carrier in this ship as some cases occurred in the 'Venerable' from which this ship's company came. I have gone through the medical history sheets and find there are four men who have had the disease in the last three years. When the ship arrives at a port where there is a laboratory I will have them examined." Unfortunately the responsible carrier had had the disease eleven years ago and if all the men with a history of enteric fever had been then examined this man might have been discovered five years earlier. The strain of bacillus, with which this carrier is infected, seems a fairly virulent type as eleven deaths are noted out of the fifty three cases he was probably responsible for. The last case in the "Formidable" epidemic developed enteric on March 12, 1914.

The following observations were made on this carrier while in hospital. The urine was always sterile. Blood cultures were negative. The Widal reaction was positive. Up to a 1 150 dilution it varied very

slightly in strength The appearance of typhoid bacilli in the stools was intermittent three of four negative examinations being followed by two or three positive results

The technique used was as follows An emulsion of faeces in normal saline was lightly centrifugalized, and allowed to stand for twelve hours in the incubator The upper layers of the fluid were plated out on Conradi's, Drigalski's, Fauque's brilliant green and Endo's media, and suspicious colonies proved by sugar reactions and agglutination tests There seems to be no difference in the efficiency of these media, all giving identically the same positive and negative results

In seventeen examinations of the faeces at about three days' intervals *B typhosus* was isolated seven times

The last point to be noted is the disposal of the patient From the naval point of view, he was not a safe man to have in any ship, where any number up to 900 men live under cramped conditions The only possible course was to invalid him out of the Service after explaining to him as carefully as possible the danger he was to others the necessity to avoid the handling of other people's food the advisability of disinfecting his hands after defrecation and, if possible the disinfection of his excreta The medical officer of health of his district was informed of his address with a view to keeping him under observation as a possible cause of enteric fever in his district A course of treatment, with a vaccine and prolonged observations would have been tried but unfortunately, the man lived too far away to render it possible

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NOTES ON THE USE OF EMETINE

By Surgeon General DONALD F HOSKYN M B R N
Royal Naval Hospital Hong Kong

The subcutaneous injections of the salts of emetine will probably in time altogether supersede the administration of ipecacuanha in the treatment of cases of amœbic dysentery

An extended experience of this drug given subcutaneously or intramuscularly shows that it does not lead to vomiting or depression and so far it has proved non injurious and has always had a rapid action on the amœbæ

The following cases illustrate its efficacy —

(1) C B, aged 28 was admitted to hospital on 13th September 1913 having suffered from diarrhœa since 1st September On admission his temperature was 99 2° F tongue was furred and the stools of which he passed eight to twelve in twenty four hours, contained a quantity of blood and a little mucus He was put on milk diet and given an astringent mixture emetine hydrochlor ½ gr being injected subcutaneously morning and evening Under this treatment he improved

On the 22nd only one stool which was normal in character was passed and the temperature, which had ranged from 99° to 100 6 F was 97° F The emetine and mixture were then stopped Syr Lactoph 1 dr was ordered thrice daily, the diet being altered to low with two eggs On the 29th the patient had a relapse, the temperature rising to 102° F

[illegible] blood and mucus accompanied by much [illegible] The diet was again changed to 'milk and emetine [illegible] lessened as before The relapse continued with decreasing [illegible] five days The diet was increased to 'low on the 4th and to full on 16th October The patient was discharged cured on 7th November

(3) A P, aged 26 who was taken ill at Canton, on 21st March 1914, with profuse diarrhœa accompanied by tenesmus, was admitted to hospital three days later The stools contained blood and mucus, while numerous active amœbæ were seen in every microscope slide examined The temperature varied from 98 8° to 99 6° F five stools were passed during the patient's first night in hospital 'Low' diet was ordered and 1 gr of emetina was injected subcutaneously every morning Under this treatment the stools decreased to three on the 25th, and one on the 26th The temperature was normal on the following day, after which no more emetine was administered 'Full' diet was ordered on the 30th the patient being discharged cured on 4th April 1914

Altogether six cases have been treated by this method In two, the dose administered was ½ gr morning and evening- These received twelve and twenty one doses respectively and required twenty six and fifty five days in hospital—an average of 16 5 doses and 40 5 days under treatment

The other four cases received 1 gr once daily They required from four to seven doses only—an average of 5 2 and were under treatment in hospital from eleven to twenty one days—an average of fifteen days One of these had suffered for twenty one days before admission to hospital He received five 1 gr- doses of emetine, and was in hospital for only thirteen days These cases seem to show that the larger doses save much time in treatment

The action of emetine does not seem to be restricted to cases which are dysenteric in character, for besides its specific action on the amœbæ of dysentery, it seems to have a remarkably tonic effect on the mucous membrane of the intestine Owing to the success of this drug in dysentery, we have lately used it in treating recent cases of simple colitis with great success In two cases of colitis with severe diarrhœa, in which amœbæ were not present in the stools, only one injection of emetina was required in each instance to effect a cure, no other medicinal treatment being adopted It is probable that in the future the range of usefulness of this drug will be still further extended in treating diseases of the intestines.

The employment of emetine in treating diseases of the liver is illustrated by the following case —

J B, aged 28 had a previous history of (1) Disease of the liver in 1910 for which he was on the sick list ten days, and (2) "Pyrexia" from 8th October to 5th November, 1913 For sixteen days of the latter period there was a slight rise in temperature (99° to 101 2° F) During the first part of the illness he passed fluid stools, and it was thought that he had enteric fever, but Widal's reaction was negative He recovered completely without an exact diagnosis being made He was now admitted to hospital on 18th February, 1914, with a history of progressive weakness frequent headaches, loss of appetite, occasional nausea and constipation For some days before admission to hospital he complained of pain in the right side below the costal margin On

examination the [illegible] on percussion to the [illegible] fourth rib in the mid axillary [illegible] the right base posteriorly

The leucocyte count was [illegible] 99 2° F on admission, rose to 101 [illegible] p m Taki[illegible] tion the previous illness in 1913 which was possibly due to a mild attack of dysentery, it was thought that the symptoms from which he suffered pointed to an abscess in the liver Therefor it was proposed to confirm this by the insertion of an aspirating needle It is a matter of regret that this was not done but on the outer hand had pus been discovered the abscess would have been opened and drained

While discussing the case Surgeon Mov[illegible]n Biovoe suggested that the subcutaneous injection of emetine might be tried Aspiration was therefore postponed, and 1 gr was injected on three successive days with a result that exceeded all expectations

The temperature fell to normal on the fifth day, the leucocyte count was 10 132 on the sixth and 8 437 on the eighth day The physical signs completely disappeared and the patient was discharged to duty on 12th March since which date he has made no complaint

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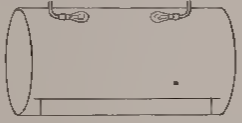
AN IMPROVISED HOT AIR CHAMBER

By Lieut Surgeon J FALCONER HALL M B R N

The following is a short account of the hot air chamber which I had made on board It is really a cylinder made of thick tin open at both ends, and fitted with two electric lamps at the top and a small stool at the bottom If the knee is placed in this chamber both ends of which are then closed and two fifty candle power lamps switched on a temperature of 200° F is obtained rapidly



The patient is always supplied with a thermometer, and told not to allow the temperature to rise above 180 F This can easily be effected by lifting the covering at the ends or switching off one of the lamps In cases of effusion into joints I have found the hot air treatment very efficacious It reduces the effusion and at the same time relieves the pain In one case of gout it acted like a charm and in some cases of rheumatic attacks it has eased the pain at once and helped to reduce the swelling in the joint

The chamber is light and portable and the patient can be treated in bed without disturbing him As a rule I start with half an hour's treatment and increase this to an hour twice daily

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NOTES ON AMBULANCE TRAINS AND DESCRIPTION OF NAVAL TRAIN NO 1

By Surgeon A Yavasour Elder R N V R

The main desiderata of an ambulance train are smoothness of running coupled with the possibility of travelling anywhere on any company's system The former point is gained by the use of long bogey coaches, while the latter is obtained by limiting the length of these bogeys The two points are somewhat antagonistic and must be met by compromise Needless to add the train should be on the corridor plan throughout, including the brake vans at each end, so that the guard can be communicated with while the train is in motion

Another important factor is that the train once equipped should be made as independent of outside assistance as possible In other words it should be self supporting by means of adequate supplies of all requisites for a journey—foodstuffs medical comforts dressings water, gas, linen, bedding &c Thus cases can be conveyed to their destination comfortably and quickly On return to the base the stocks are renewed while the train is being cleaned in readiness for another run

The next point for consideration is the method of carrying "cot cases" There are two ways of accomplishing this—the "fixed cot" and the "movable cot" In the former the cot is a permanent fitting of a coach, while in the latter it is movable and can be conveyed in any similar coach on the train

On military trains the cots are fixed, being fitted lengthwise in two tiers on both sides of the coach In the centre is a gangway The lower cot is hinged to the side of the coach and in the centre it has two movable legs The upper cot is on the Pullman sleeping car system and can be tipped up out of the way when not in use

The objections to the fixed cot are as follows —

(1) The cot and patient become a component of the coach and are subjected to its every movement while running

(2) As the cot is fixed in the train the patient has to be brought into the coach on a stretcher and then transferred to the cot On arrival at the destination the process must be reversed Thus the patient is being continually moved about during his journey from the port of arrival to the base hospital

In cases of severe injury this repeated transfer is most prejudicial and not unusually, painful for the patient Some cases do not permit of this continual change and the stretcher has to be taken into the train placed on a cot and travels with the patient to his final destination Under such circumstances the patient does not derive the benefit of the spring mattress with which the cot is fitted, because the whole weight of the stretcher is supported by the ends of the cot frame All jars are transmitted directly to the patient through the fixed cot

In the naval train the cots are slung in two tiers, upper and lower, on hooks on both sides from hooks in the roof of the coach When not in use the cots are lashed to the side of the coach a slender iron bar being placed between the cot framework and the side of the coach

The advantages of this method are —

(1) The cot is not a component part of the coach Vertical movement is practically absorbed through the suspension, and lateral jerks are taken up by the fender

(2) The cot can be removed from the coach and used as a stretcher in conveying the patient to and from the train Thus there is no intermediate transfer between the place of arrival in England and the hospital

Naval cases are dealt with as follows The patient is brought by a Service ambulance either in his own ship or the hospital ship The cot is conveyed to the train and suspended in a coach, the train giving up its own cots completely fitted, in exchange hence there is no delay lost in loading the train On arrival at the hospital the same procedure is followed the train receiving a clean cot for every one sent to the hospital The standard equipment of a cot is one mattress one pillow and two blankets

(3) If a case is too serious to be moved from a stretcher the cot and stretcher and patient can be taken into the train, and suspended in a cot by means of lanyards

(4) For cleaning purposes the cots are taken out of a coach leaving the bare walls, which can then be thoroughly washed down the cots themselves are unlaced and scrubbed being disinfected if necessary before replacement

Thus it will be seen that the movable cot system is the most comfortable for the patient in every way The drawbacks to this method are —

(1) The cots once hooked on, must be firmly lashed up against the fender at the side of the coach There must be no play otherwise considerable lateral jarring is felt and there is also a forward swing when the train starts or stops The officer in charge of the train must pay special attention to this point satisfying himself by personal examination of each cot that the lashings are secure During the run they should be examined as occasionally they work loose Patients should be warned to call the attendant's attention if this happens

(2) If as is usually the case the coach is being loaded at both side doors simultaneously then a definite routine of placing the cots in position must be adopted, to avoid bearer parties interfering with each other

(3) To place a cot in position requires six bearers, four to hold it while the other two one at each end hook it on whereas a case on a stretcher only requires four or five at the most to effect the transfer into an upper berth For lower berths three bearers are sufficient

It will be seen that the movable cot system requires a large working staff At the same time the additional two men act as reliefs when the train crew are called upon to do their own carrying to and from the train if outside help is unobtainable or deficient in quantity

Water—The water supply—domestic and sanitary—is an important item Very large quantities are called for during a trip Unless

additional tanks if they have not been fitted by the railway authorities these will have to be added before the train is fit for service A number of field service water bottles distributed throughout the train, serve the double function of increasing the water supply and facilitating its distribution They can be readily refilled at any wayside station where no facilities for rapidly filling the main storage tanks exist Tin mugs for use with the bottles should be provided

Speed of the Train—From the point of view of the comfort of patients there is no hard and fast speed-limit applicable to ambulance trains Briefly, where the permanent way is good fifty five or sixty miles per hour is not too fast, whereas, if the road is bad, twenty miles an hour is an excessive speed On good roads at high speeds the motion of the train is less perceptible than even at moderate speeds, thirty miles an hour on an inferior road

A speed of forty miles per hour has apparently been fixed by the Government authorities This for average running time may be perfectly satisfactory, but practical experience on the naval train has shown that some of the drivers take the order literally, irrespective of the condition of the road and much to the discomfort of their passengers

The drivers, while maintaining an average speed for the whole run, should be permitted to use their own discretion in favourable localities If this is considered undesirable then it should not be difficult for the railway authorities to plot out speed tables for the various sections of their line instructing the drivers to adhere strictly to them

Care of Patients—The surgical scope of an ambulance train while in motion is very limited It is in fact, frankly disappointing With the exception of emergencies and occasional cases where the site of a lesion is favourable the experience of seventeen hundred assorted cases has shown that attempts to 'dress' patients *en route* invariably cause more actual discomfort and in some cases acute suffering, than is justified by the fact of the case having been dressed Furthermore distances are not so great in this country that a case cannot be left for three or four hours longer than would otherwise obtain

To be brief, beyond setting a tight bandage or temporarily adjusting a damaged part, and a not too sparing use of morphia where indicated, the whole efforts of the train staff should be concentrated upon making the journey as comfortable and pleasant for the patients as possible under the circumstances

These efforts may be summed up as consisting of constant attention to details in regard to food and drink warmth, and obtaining the position of maximum ease for the patients

Some trains are fitted with an operating theatre This has yet to justify itself For use the train must be side tracked, and it is a moot point whether a case possibly requiring operation should either be allowed to travel or whether it should not be landed at the first possible point if operation is called for No case however urgent could conceivably be satisfactorily operated upon while the train was running It might be attempted but the circumstances justifying the attempt would be most exceptional and hardly worth considering It is true that in the event of an invasion of this country the train might serve as a mobile field hospital Even then the enemy is not likely to allow it to

remain stationary long at any given point to say nothing of the blockage of the line for other purposes

Mental Cases—For the milder and quieter cases no provision beyond a special watch is required, but the noisy and violent types should be segregated for their own safety and the welfare of other patients In the Naval train two padded cells have been fitted which meet these requirements A patient placed in the cell can safely be left to his own devices during the journey

The Naval Ambulance Train No 1 is a unit of the Medical Transport System organized in the Nore Command by Surgeon General Sir James Porter K C B , R N and consists of twelve coaches belonging to the London and North Western Railway They are on the "corridor plan throughout including the guard or brake van at each end

Commencing from the engine the train is made up as follows A guard's van one seven compartment corridor coach two cot coaches a day coach three cot coaches a store coach a kitchen car with dining saloon a family saloon and finally, a guard's van

The actual coach length of the train is 518 ft , while the total length overall buffer to buffer is 568 ft

In the front guard's van which is used as accommodation for the train crew, sixteen hammocks can be slung and when not required for patients the adjoining compartment coach is also used by the crew

The other guard's van is used for patients baggage and effects The store coach is technically known as a brake third containing five ordinary compartments and a brake van In the brake portion lockers for bedding and linen clean and soiled have been fitted and also racks for ward utensils A safe for valuables is also placed in this part One compartment of this coach is used as a store room for dry stores and groceries another as an office for administrative purposes and a third is allotted to the cook and the senior sick berth steward of the train The remaining two compartments are used as indicated by circumstances isolation cabins &c

The Medical Staff—Two medical officers and two nursing sisters are accommodated in the family saloon at the rear of the train This is divided up into three compartments of which the two end ones are fitted with two facultative sleeping berths each while the centre one acts as a sitting room when the ordinary dining saloon is occupied by patients

The train crew is composed of thirty eight members of the St John Ambulance Brigade belonging to the Royal Naval Auxiliary Sick Berth Reserve, and a sick berth steward working under a medical officer Royal Navy The men are all well versed in the ordinary work of the Brigade and in addition have been specially trained since the war began for service on the train A cook belonging to the railway company's staff is also carried

Cot Coaches—The cot coaches are five in number They are used in peace time for conveyance of parcel mail and are each 45 ft long 8 ft wide and 7 ft high at the side rising to 8 ft in the centre by means of a clerestory At both ends are two sliding half doors giving access to adjoining coaches while on each side are two sliding doors 4 ft 6 in situated equidistantly from each end that is there are 12 ft of space between the doors themselves and the end of the coach

Each coach is steam heated by overhead pipes in the clerestory

Fig. 1.—Lateral view of head.

Fig. 2.—Showing method of applying bandage.

portion, a thermometer being used in a [illegible] are lighted by gas in incandescent lamps [illegible] ing. A simple device has been fitted in the [illegible] ntrol ling the gas from inside as the type of [illegible] has only outside control. For emergency [illegible] ket torches is carried.

FIG. 3.—Cot c[illegible]

Each coach contains twenty [illegible] upper and lower. The upp[illegible] ks let into the roof of the coach, [illegible] the same books by means of [illegible] and and a hook at the lower (fig. 1). The [illegible] length and are interchangeable. They can be [illegible] gas, stretch[illegible] or for suspending special cot cases in the cent[illegible] the coach, as [illegible] in fig. 2.

At the side of the coach is a series of "fenders" properly spaced, against which the cots are lashed when travelling. They are made of canvas covered pads of tow mounted on wood bases, which are screwed on to the side of the coach as shown in the illustration.

In order to relieve the tedium of a long journey for patients, the windows of the coaches are not obscured, privacy is easily obtained by pinning the flap of a cot over the window.

Sitting Cases.—Ordinary accommodation for sitting cases is provided by a corridor coach containing seven separate compartments each holding six patients comfortably. Additional space is provided in one or more cot coaches, if not otherwise occupied, by lowering the cots on to the floor. Two cots are placed one above the other on the floor, and a third is utilized to form a back rest being secured by the ordinary cot lashings to the side of the coach. The seats are arranged on one side of the coach for half its length and then on the other for the rest. Thus one doorway is left free on each side, and an uninterrupted gangway is obtained throughout the whole length of the coach (*vide* fig. 3). The patients have ample room to stretch their legs or walk about without interfering with others. The lanyards for the lower cots are hooked together, forming a little line to facilitate walking along the coach. In this way thirty six to forty sitting patients can be carried comfortably in each coach.

Emergency accommodation for short journeys is provided by means of folding seats in the brake vans at each end of the train. A van if un occupied by baggage, will seat twenty four.

Day Coach.—The utility and comfort of the tram are greatly enhanced by the inclusion of what may be termed the day coach in its composition. It is an ordinary parcel van similar to those used for cot cases. At one end two w c.'s have been fitted one on either side at the other end, on one side, there are two padded rooms, 6 ft. by 3 ft. by 7 ft. for the safe carriage of violent or noisy mental cases. Opposite to these is a small "dressing station" fitted with table lockers, sink and sanitary fan. This can be screened off by means of a curtain drawn across the coach and here ambulant cases can have their dressings renewed in comfort and privacy.

On each side of the central portion of the coach and at suitable intervals apart eight wash-basins fitted with water supply have been installed. When not in use the basins are covered with a flap hinged to the side of the coach. This acts as a table for serving meals or other purposes. Sitting accommodation is provided by collapsible forms. Twenty eight patients can sit down to a meal at a time. This coach has proved a great comfort to men on long journeys (*vide* fig. 4).

Food is brought to the coach from the galley by means of specially designed carriers. They are wooden boxes fitted with shelves for carrying six plates at a time one above the other. The shelves are all movable for cleaning purposes, and the upper portion of the carrier is divided into two compartments by means of the handle. In these compartments the cutlery and grants are carried to and from the coach.

The coach is situated almost centrally in the train so that the distance from the kitchen is not so great. It also serves to divide the "sitting cases" from the cot coaches ensuring quiet and freedom from tobacco fumes.

Officers' Accommodation.—One coach No. 5, is specially reserved for

cot cases among officers. If circumstances permit the cot is carried in the centre of the coach suspended by four lanyards one at each corner as shown in the illustration (fig. 2). The cot can either swing freely or be lashed down to the sides of the coach according to indications, the former being a very comfortable method of travelling. Washable canvas screens are fitted to all the doors and individual cots can be screened off if desired. Otherwise the coach is fitted similarly to the rest.

Sitting-up accommodation for ten officers is provided in the dining saloon. If necessary sleeping accommodation for eight is obtained by cots specially made to fit across the seats of the dining saloon. Individual privacy is given by fore and aft canvas curtains on both sides of the centre gangway as in a Pullman sleeping car.

[illegible]

[illegible] full train is 120 cots and 7[illegible] such as the duty coach, [illegible] cots, the main feature of [illegible] and general suitability to the varying demand[illegible]. A cot could be converted for sitting cases will [illegible] comfortably for short [illegible] 18 and over have been carried [illegible] crowding. Without [illegible] a guard's van will hold [illegible] down. The largest number carried on the train so [illegible] been 303.

Up to 1st December [illegible] journeys had been made, covering a total distance of 8841 miles and conveying [illegible]. These were as follows:—

	[illegible]	Total
Navy	961	739
Army	909	197
Belgian	333	178
German	20	35
[illegible]	1 223	1 749

The cases have been [illegible] medical surgical and mental [illegible] there have been cases of [illegible] pneumonia diseases of all descriptions bullet and shrapnel wounds

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ARRANGEMENTS FOR DEALING WITH THE WOUNDED ON BOARD SHIP

By Fleet Surgeon W. T. COLBORNE, R.N.

The following instructions which have been drawn up as complete and as simple in detail as possible were issued to the medical staff of the Neptune during 1913. Each individual member of the staff received a copy and was informed as to what part of it would constitute his particular duty.

This organization may be of interest to medical officers serving in ships of the Neptune class. Possibly it may provoke discussion and a comparison of methods.

When War is Possible or Imminent

(1) Check all medical and surgical stores, and make out demands to complete to full scale, including the extra issues for war as laid down in the Book of Scales of Medical Stores. (A list of these issues has been already but is not included in these remarks.)

The demands should be sent to the naval hospital or depot at the port at which the ship will fit out or to the depot to which the ship belongs in order that the stores may be packed ready for issue in short time if required.

The following stores also to be drawn if they have not already been [illegible]:

From the Paymaster of the Ship —

Hurricane lamps, 12; scissors, 12; towels, 50; blankets, 10.

From the Boatswain

Rope slings, 4 for hoisting out stretchers after the action.

From the Carpenter —

Wooden battens, 5 pieces 3 in. wide by ¾ in. thick and 3 ft. long for [illegible] splints.

Wooden battens, 12 pieces 3 in. wide by ½ in. thick and 3 in. long for [illegible].

Saws, small, 2 for cutting splints.

Sheets of tin, 6 for making splints.

(2) Pack the cupboards in the distributing stations with surgical dressings, which should be sterilized first, if possible. Labels of contents to be placed on drawers, etc., of cupboards.

Dressings to be placed on the cupboards are —

Lint in roll and cut up lengthwise in 4 to 1 yard
Cotton wool in rolls and cut up in the same way as lint
Bandages woven calico and flannel
Cyanide gauze in tins, opened
First aid dressings
Scissors and safety pins
Slings of calico and flannel
Perchloride solutroe pellets
Picric acid dressings

(3) Sterilize all surgical instruments, those in the medical instrument chest field chests, and pocket cases The instruments should be sterilized in the metal cases and racks in which they are kept and replaced in the chests to which they belong

(4) Draw from the Paymaster the medical comforts and condensed milk Place such as are likely to be required for immediate use in the distributing stations with the tin opener, the remainder in some easily accessible store or other compartment

(5) See that all the appliances for the supply of hot water are efficient state, and make out a list of what vessels and cans may be used for water, e g , cans from officers cabins &c

(6) Prepare antiseptic solutions This refers to solutions made from bulk and not from solution pellets The solutions should be made in concentrated form stored in the 40 *oz* poison bottles and duly labelled Prepare also the following Solution morphia hypodermic 1 in 5 m (for use of medical officers only)

(7) Prepare a stock of first aid dressings of the sizes 12 by 8 in , and 6 in by 8 in These dressings to consist of a piece of lint or ordinary lint lchief with a piece of wool and kept in place by a bandage stitched across, to be made as the sample on patterns kept in the sick bay When finished these dressings are to be sterilized and wrapped separately in paper They are then to be stored in the cupboards in the distributing stations and in the haversacks A supply should also be stored in the small drawers in the chest of drawers in officers cabins in which they could be carried when required

(8) Pack all first aid haversacks according to the pattern kept in the sick berth Each haversack to have a luggage label marked stating to what part of the ship it belongs

Each Haversack to contain Tourniquet 1 first aid dressings 2 each size bandages 6 of sizes pieces of lint for pads 10 pieces of wool 10 slings, 2 pieces of lint with bone ring, 6 picric acid dressings 4 For engine room and stokeholds the picric acid dressings to be 10 instead of 2 in the first aid haversacks

(9) Pack all service canvas cots ready for use after the action and stow them in the place told off on the list

(10) Overhaul all stretchers and see that slings, pillows are satisfactory Each stretcher to have a luggage label attached stating the part of the ship that will be worked by it after the action

(11) Stow medical history sheets, &c in a box and place in a safe place

(12) It is best the ship's company to eliminate the unfit as they would be landed before leaving port

(13) If possible, sterilize serge suits, &c. for gun's crews and others roll them in handkerchiefs and place in bottom of men's bags ready for use during action

(14) Muster the first aid party, and see that they all understand the parts of the ship and the duties expected of them

(15) In accordance with Home Fleet Temporary Memoranda, No 116, of 11th April 1911 two additional sick berth ratings would be sent to the ship

PRIOR TO LEAVING PORT AND ON DECLARATION OF WAR

(1) Draw medical and surgical stores previously demanded

(2) Land the unfit

(3) Dismantle the sick berth, and stow the articles in the distributing stations as shown on the list made out and kept in the sick bay, leaving only such articles as are required for immediate use These articles would be a few stock medicines and drugs, and a few surgical dressings and instruments for emergencies

DURING THE ACTION

(1) The medical staff and ambulance party will remain in the distributing stations to which they have been told off, until the action is over or there is a lull

(2) During the period of waiting, first aid dressings splints &c., can be overhauled, and the duties of the party fully explained to them

AFTER THE ACTION

(1) Immediately the action is over or there is a lull the stretcher parties will take the stretchers to the part of the ship to which they have been respectively told off as shown by the luggage labels attached to them The stretcher party, in addition to the stretcher will take with them a first aid bag of dressings, hot bovril and coffee as well as drinking vessels The bovril and coffee will have been previously made in a concentrated form, so that the addition of hot water would render it palatable and fit for use On arrival at their station the party will move the wounded from the turret or other place to the deck, and out of the way of the guns They will render such first aid as is possible, but the wounded are not to be otherwise moved without further orders

(2) The senior medical officer will make a rapid tour of the upper deck in order to get an estimate of the number and condition of the wounded, see that they are receiving proper attention, and give any necessary hypodermic injections attaching to each person given an injection a label, stating the dose and time to prevent duplication At the same time that the senior medical officer is going round the upper deck the staff surgeon will carry out a similar duty on the main deck

(3) If there is only a lull in the action then the senior medical officer and the staff surgeon will supervise the removal of the wounded to the bag flats and awning rooms by the stretcher parties These compartments are behind armour, and the wounded would remain there until the action is over, a certain number of the ambulance party being told off to look after them

(4) If the action is over.—Whilst the ambulance parties are searching round the upper and main decks a party will rig up a [illegible] previously determined a temporary dressing station. To this [illegible] dressing station the stretcher parties will bring the wounded [illegible] their first aid dressings may be attended to and a selection made of those who will require special treatment, such as operation later. After attention at these temporary dressing stations the stretcher parties will remove the wounded to a selected place for nursing.

A list of articles required for these temporary dressing stations is made out and kept in the sick bay.

(5) The insane or mentally affected would be placed in the cells or other selected place under a guard.

(6) If weather and other circumstances permit and there is a possibility of the wounded being transferred to a hospital ship or shore establishment in a short time, those injured on the upper deck would remain there, and preparation would be made for disembarking them—by means of stretchers and chairs fitted with slings, and by derrick with a single whip.

(7) If there is no chance of disembarking the wounded for some time the medical officers will select a site for an operation room the selection depending on light, ventilation, and accessibility. All the wounded having received efficient first aid treatment and their feeding and nursing having been arranged, then those requiring operation will be attended to, and any others requiring redressing. As soon as possible each of the wounded should have attached to his person a label, stating his name, rank, rating, official number, the nature of injury, how dressed and date and time of dressing.

Miscellaneous

Distribution of First aid Bags

Before action the first aid bags will be distributed as detailed below, each bag being labelled with the part of the ship to which it has been assigned —

1 bag to each turret.
1 bag to each 4-in. battery.
1 bag to conning tower.
2 bags to each engine room, one to be the ordinary first aid bag, the other to contain picric acid dressings only. These bags to be labelled one "First Aid," the other "Dressings for Burns."
2 bags to each stokehold, the same as for the engine rooms.
10 spare bags to be kept in each distributing station for use after the action as required.

Distribution of Stretchers

Each stretcher to be manned by four men, and to be in charge of a man passed in first aid. A first aid bag and supply of medical comforts, water, and drinking vessels to go with each stretcher. The stretcher will be taken to the part of the ship assigned to it after the action. Each stretcher and bag to be labelled as to the part of the ship to be worked by them.

1 stretcher for area around each turret.
1 stretcher for area before wardroom galley on main deck.

1 stretcher [illegible] broom galley and ship's galley
1 stretcher [illegible] galley on main deck
1 Barker's sledge [illegible] and stokehold use to be kept until required in after distributing station

1 Neil Robertson's stretcher to be kept in fore distributing station for use with operation table if as required

In the event of one distributing station being destroyed two stretchers will work the whole of the upper deck and two stretchers the whole of the main deck

After the action the surviving medical officer will make his station on the upper or main deck as he considers best and then the stretcher parties must bring all cases to him

Various Lists made out and kept in the Sick Bay

(1) List of additional stores to be demanded for war time.
(2) List of articles to be drawn from Paymaster Carpenter, and Boatswain.
(3) List of antiseptic solutions and mixtures to be made up
(4) List of contents of each first aid haversack
(5) List of articles required for temporary dressing stations
(6) List of articles to be stored during action in the fore and after distributing stations and other storerooms

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ACTION STATIONS IN TIME OF WAR

(In a Battleship of the King Edward VII Class)

By Fleet Surgeon A C Bean R N (H M S 'Britannia')

Experience is always a hard master but often the lessons learned most of the best and are worthy of being recorded for future guidance The following notes are made with this object in view the ship having [illegible] more than four months 'prepared for action

This paper does not go beyond the limits of 'prepare for action' and is confined to point out the difficulties of making satisfactory arrangements for the stowing of medical stores and appliances and for the treatment of the sick when action is postponed for months after the declaration of war

It has been customary during peace to 'prepare for war,' for the Admiral's inspection two days are usually allotted to the preparation and then comes the inspection after which action stations are dismantled stores are returned and peace conditions once more prevail

So far at least as medical organization is concerned, this is a great mistake All preparations for war should remain existent for at least a fortnight (1) to test fully the efficacy of the arrangements, and (2) to accustom the medical staff in dealing with cases of sickness under war conditions

During war action may be imminent at any moment day or night it is therefore essential that all preparations should be so far advanced that little or nothing remains to be done to put us in a position to deal with wounded

[illegible] be left in the [illegible] [illegible] the [illegible] on [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] tanks for [illegible] [illegible] [illegible] All [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] used at all [illegible] [illegible] [illegible]

What [illegible] can they be [illegible] requirements?

I.—The action [illegible] which are situated [illegible] flats behind armour.

The after station [illegible] It is small, [illegible] ventilated, and unsuitable [illegible] half of the medical and surgical [illegible] for [illegible] cots, &c., and as a position [illegible] the medical staff [illegible] to minimize the risk of all [illegible] all the medical staff being put out of action [illegible]

The main station (and [illegible] take the place [illegible] dispensary, surgical [illegible] station [illegible] surgical appliances for [illegible] spare stretchers, X-ray apparatus, instrument [illegible]

The main station which varies somewhat in [illegible] the class, but it is believed compares favourably in [illegible] with others, is approximately 30 ft. long, [illegible] ft. wide, and [illegible] high. It has fittings for hammocks and racks for bags, but some of the fittings have been cleared of hammocks and all bag racks [illegible] stowed elsewhere have been [illegible] leaving almost all the space available for medical purposes.

II.—The provision for stores [illegible] cupboard for dressings at each station, the upper part [illegible] fitted with shelves, the lower part [illegible] fitted with drawers.

The requirements for stores are:

(a) A dispensary cupboard for drugs and [illegible]

(b) A special cupboard for [illegible] Winchester quart and containers, bottle of spirits, oils, [illegible]

(c) A large cupboard for linen, blankets, [illegible] and mattresses.

(d) A cupboard with shelves and [illegible] for surgical dressings (wool, lint, gauze, bandages, &c.)

(e) A cupboard for crockery and [illegible]

(f) A cupboard for medical history sheets, books and paper.

The following arrangements have been [illegible] to meet the general requirements, but they are far from ideal, and [illegible] may occur when dealing with numbers of wounded [illegible] immediately to hand.

(1) The top part of the dispensary cupboard has been moved below. It takes the contents of one No. 1 chest and [illegible] but has no

F

spaces b[illegible] take the large bottles that have been stowed on one side [illegible] for dressings

(2) The [illegible] bone chest has been emptied into a linen store It takes about [illegible] quantity of linen blankets and pillows the remainder of which [illegible] made up into a bundle

(3) The [illegible] packed in a bespoke top of a bag rack and [illegible] number [illegible]

(4) When [illegible] been obtained and filled with part of the [illegible] supply [illegible] and half of the war supply of [illegible] dressings [illegible] of the peace stores at this station being stowed in the [illegible] and my drawers available

[illegible] of the sick bay the Medical Officer's knee hole [illegible] drawers of the dressing cupboard are used for [illegible] and instruments in everyday use

(5) [illegible] dressing cupboard is set apart for medical [illegible] [illegible] convenient place for the special cupboard [illegible] containing a mattress spare stretchers and [illegible] in the [illegible] hammock netting and overhead [illegible]

[illegible] not [illegible] in everyday use are packed in a [illegible]

[illegible] [illegible] [illegible] are arranged on the spare [illegible] [illegible] [illegible]

(6) [illegible] kept permanently ready for

[illegible] (except [illegible] dressings) remain in the [illegible] [illegible] two thirds at the other station

[illegible] [illegible] [illegible] is [illegible] off into two spaces [illegible] [illegible] which has been improvised for [illegible] [illegible] [illegible] and dressings to

[illegible] [illegible] [illegible] patients and this is only done [illegible] [illegible] [illegible] cases [illegible] removal to hospital, bedding is taken [illegible] [illegible] as required to the sick bay

If [illegible] [illegible] the patients are removed to the main station and slung [illegible] hammocks as usual is

The temperatures in cold weather with watertight doors closed from about 70° to [illegible] and in hot weather from 75° to 90° F according to the length of time at sea and the number of boilers lit up The ventilation [illegible] with the fans running and in bad weather at sea the atmosphere is admirably preferable to that of the sick bay

Plaster [illegible] cream do not keep well below they are kept in the sick bay [illegible] below as requisite

In conclusion an endeavour has been made to emphasize three essential points —

(1) The necessity of having complete arrangements and fittings permanently at the main action station to deal with ordinary cases of sickness when the ship has to remain prepared for war for months at end

(2) The necessity of having all stores below and so arranged that they may be immediately ready to hand in case of a sudden action

(3) The importance of testing these arrangements for a fortnight or more during time of peace

Reviews.

MANUAL OF INSTRUCTIONS FOR THE ROYAL NAVAL SICK BERTH STAFF By Staff Surgeon George O M Dickenson [illegible] London Sidney Appleton Ltd 1914 [illegible] Price 2s net

[illegible] provides a concise and practical [illegible] the sick berth staff at [illegible] should also be most useful [illegible] to the [illegible] Naval Medical Service [illegible] Sick Berth Petty Officers [illegible] when [illegible] Although [illegible] both staff [illegible] living [illegible] nurse [illegible] them [illegible] the [illegible] injuries [illegible] must [illegible] who have [illegible] with [illegible] many [illegible] only brief [illegible] medical officers [illegible] size [illegible] appears to have omitted nothing useful, and [illegible] have been left out

OPERATIVE SURGERY By Edward H Taylor MD [illegible] F R C S I Professor of Surgery [illegible] and Edward A Churchill 1911 1 vol Pp 521 [illegible] in colour Price 30s net

This excellent work on the operative surgery of the head and neck, the thorax and the abdomen in which are described only those operations most frequently required and those a surgeon would be called upon to perform should prove of great value to naval medical officers An account of all the operations performed by these regions is not given but the book is comprehensive and practical It will appeal to many in that the present volume originated in connection with post-graduate courses in Trinity College, which from time to time officers of the Service have attended

The [illegible] which [illegible] to [illegible] of [illegible] for the first [illegible] to the [illegible] of [illegible] is [illegible] and the author [illegible] uses give the [illegible] which by experience [illegible] has found to be the [illegible]

[illegible] which are numerous for the size of the [illegible] with one or two exceptions they are [illegible] stereoscopic photographs taken in the [illegible] represent the various stages in the more important operations [illegible] be said that the illustrations are unsurpassed in excellence of detail and with the explanatory notes which are given beneath each will make well repay [illegible]

The volume comprises four Sections No I being devoted to surgical technique which is described in detail Here also is included an admirable account of [illegible] and their administration written by Mr Adams M'Connell [illegible] In Section II on the operative procedures in the [illegible] of head and neck operations with cranial operations in which the author describes in fractions of the [illegible] are fully given Operations on the thyroid gland will be found in the [illegible] section Section III is allotted to the thorax and includes the operative treatment of breast cancer empyema and pericardial effusions In Section IV operations on the abdomen are described including the [illegible] ureter the prostate the penis the scrotum testicle and spermatic cord Here is given the author's modification of Bassini's herniotomy the main feature of which is a less extensive division of the [illegible] of the external oblique than is entailed by Bassini's operation On nephrectomy when discussing the relative advantages of urinary segregation and ureteral catheterization in combination of the functional capacity of the kidneys the former method appears to be somewhat favoured, it is admitted however that in the present day powerful [illegible] will be found for each of these methods

The whole book is carefully written lucid but not voluminous and thoroughly up to date It enhances the already high reputation of the writer as a surgeon and a teacher and can be recommended with confidence W L M

GAS POISONING IN MINING AND OTHER INDUSTRIES By John Glaister M D, D P H and D D Logan M D, D P H Edinburgh L and S Livingstone Pp 470 With plans, 38 illustrations, 2 coloured Price 10s 6d net

The importance of the subject is one that should be well understood by naval medical officers, for though explosions like those that occur in mines do not take place in ships, yet instances of CO poisoning are not infrequent The authors in their introductory chapter state, that the greater part of the available information on this subject is either in Blue books difficult to get or in works of physiology rarely read many of the most important being by Professor Haldane The symptoms and sequelæ of carbon monoxide poisoning are very various and often quite misunderstood very frequently the affected person has a peculiar drunken appearance and serious errors have been made It has been stated in the *Lancet* that CO is rapidly becoming a modern terror After describing the various forms of 'damps' and the injurious products generated in mines

[illegible] symptoms of [illegible] follow The experiments of [illegible] absorbed CO to the extent of [illegible] exertion and coexist mainly [illegible] rest these come on when the [illegible] when about one third of the [illegible] At 50 per cent the person [illegible] when it is 80 per cent

It must be remembered that [illegible] the gas [illegible] although there may be only 1 per [illegible] inospl [illegible] become saturated to 50 per cent or more With proloi [illegible] 1 per cent of CO recovery is [illegible] 0 2 per cent [illegible] ptoms appear and with 4 per cent [illegible] rapidly bron [illegible] The detection of CO in the blood [illegible] lly easily made by the [illegible] metric test Three tubes should be [illegible] In number one [illegible] ul op of the blood with 99 of or [illegible] in number two [illegible] dilution of ordinary healthy blood [illegible] CO [illegible] present in the [illegible] colour will be more or less pink [illegible] two being more [illegible] yellow The third tube should [illegible] determine the app [illegible] degrees of saturation a dilution of [illegible] with [illegible] minds app [illegible] it is passed coal gas This is then [illegible] only shaken and the [illegible] repeated until the mixture is chocolate [illegible] The [illegible] estimat [illegible] be made as suggested by Haldane in the [illegible] spectroscope [illegible]

The final chapter is devoted to [illegible] of [illegible] appl [illegible]

This book is well worth a [illegible] study and [illegible] [illegible] recommended

F W [illegible] S

Minor Surgery and Bandaging Henry Percy Pilcher Fifteenth [illegible] Edited by G H Morriston Davies M D Mc Cornish [illegible] London J and A Churchill 7 Great Marlborough Street W 1911 Pp 467 239 illustrations Price 7s 6d net

The fact that this work has reached the fifteenth edition [illegible] great is the demand for it From the present edition the chapters on Poisons and their Antidotes and On Cases [illegible] have been omitted while that on The Examination of the Patient [illegible] the latter and several additional operations [illegible] varicose veins, varicocele [illegible] These changes constitute [illegible] provement on previous editions but leave the [illegible] classified as minor surgery Difficult problems [illegible] with in a manner which is calculated to help [illegible] service with no opportunity of consultation [illegible] obviously intended for house surgeons we think [illegible] appointed to hospitals from sea going ships and those about [illegible] a course of hospital study will find that a careful perusal of [illegible] will refresh their memory on several most useful practical points

R C M

Abstracts and Translations.

Hutchinson, T. The Pathological Affinities of Beriberi and Scurvy. *Journ. Amer. Med. Assoc.* 1914, vol. lxiii., No. 15, pp. 1290-1291.

The work of Funk and others has shown that if foods are deprived of [illegible] deficient in substances known as vitamines those who use [illegible] staple articles of diet are liable to suffer from certain conditions of [illegible] called deficiency diseases. The author includes among these [illegible] infantile scurvy, experimental scurvy of guinea-pigs, ship beriberi, [illegible] beriberi, and polyneuritis gallinarum, but he excludes pellagra, about which we have not sufficient knowledge.

He gives a short summary of these conditions, and in a table shows (1) The manner in which they overlap, (2) the chief pathological differences. He recognises, besides ship beriberi several varieties, such as infantile and asylum beriberi, wet and dry beriberi, the Brazilian type described by Lovelace, endemic dropsy and sudamic peripheral neuritis. When on a visit to South Africa with General Gorgas, he had an opportunity of studying a peculiar type of scurvy affecting the miners on the Rand, and he was struck by the similarity of the cardiac condition as seen *post mortem* with that commonly present in true beriberi, viz. a concentric hypertrophy and dilation of the right side, the left being normal. Further study showed that there were also marked degenerations of the vagus nerves, like those seen in beriberi. The disease was not infectious, but depended upon the following factors. A staple diet of over-milled corn, over-cooked corn, and over-boiled meat, with a deficiency of vegetables. On the clinical side the disease showed great variations, from mild cases with spongy gums only, to those with extensive [illegible] changes, some showed marked rickety symptoms with destruction of the chondro-costal junctions and even collapse of the sternum as in Harrison's sternal groove, other cases were more like beriberi, but this disease, like rickets, may be definitely excluded (even in a latent form as seen in infantile scurvy) by the fact that the knee-jerks were always exaggerated, and moreover there was neither anasarca, paralysis, nor extreme cardiac atrophy.

The Rand scurvy differs from the ordinary form by showing cardiac and vagus changes, and by being less amenable to treatment. Scurvy thus shades off into beriberi in one direction and rickets in the other. He noted peculiar racial and personal idiosyncrasies which have an unknown influence on the symptoms produced, for with the same deficient diet one set of African negroes may get scurvy, others rickets, and roughly a deficiency diet in a tropical African negro miner will produce severe scurvy, in a Cape Colony African labourer mild scurvy only. P. W. B. S.

Brandon (W. L.) and Cooper (E. A.). The Influence of Metabolic Factors in Beriberi, *Journ. Amer. Med. Soc.*

These authors have carried out a large number of feeding experiments with fowls for the purpose of determining the precise *rôle* which the anti-beriberi substances (vitamines) play in metabolism, and to fix the quanti-

tative relatio[illegible] th[illegible] Birds, as is well k[illegible] rice, which [illegible] the amount of [illegible] death takes plac[illegible] did not prolong life as [illegible] noticed in man, for well [illegible] than the undoubted and [illegible] not so liable as men [illegible] polished rice component of the [illegible] generally produced an increase of beriberi

From these and [illegible] facts that with rice eating people the variety [illegible] the quantity both absolute and relative of the [illegible] in other words the amount of nutriment [illegible] by the organism increases with the quantity of [illegible] for the prevention of beriberi, the proportion of the [illegible] stuff in the diet must be as high as possible [illegible] deficient in the active substance should [illegible] W B S

McCrae (W) The Phosphorus Content of Maize and Rice *Journal of Hygiene*, 1914 vol xiv No 3 pp [illegible]

As the P_2O_5 is the indicator of the [illegible] likely to be for maize Fraser and Stanton [illegible] which contains 0 469 per cent of P_2O_5 polished [illegible] the polishings of rice 4 3 When the phosphorus [illegible] by pearling off the outer part of the grain the [illegible] or also lost and deficiency diseases may likely [illegible] examination of maize flour there was found to [illegible] though rather less loss of the P_2O_5 as compared with that of [illegible] It is therefore probable that the diet of maize meal is [illegible] as that of white rice When samples of maize were so treated that 30 per cent of the original grain was converted into [illegible] extraction of P_2O_5 and therefore vitamine) was found to be very small

Experiments on 6 000 native labourers [illegible] Transvaal for whom maize is the staple diet, are being conducted with the new and the old meal the men being divided into two equal groups So far the incidence of disease among those using the new meal is much less than in those using the old P W B S

Emery Nouvelle Contribution [illegible] l'Etude des Accidents du Salvarsan 1914 *La Clinique*

The occurrence of severe accidents and even death after administration of salvarsan or neo salvarsan made it necessary to search for the reason of these unfortunate results The first explanation offered was that the drugs were poisonous to man the patient researches of Ehrlich however have shown that it is not toxic and the five years experience of its administration to man, even when given sometimes in very large doses, also disproves this but why, if it is non toxic in itself does it in some cases give rise to such serious reaction ? The causes appear to be

various [illegible] well. They may [illegible] into two [illegible] of the dust [illegible] to distribute the [illegible] position [illegible] protect [illegible] elsewhere [illegible] faulty [illegible] prevent [illegible] pieces [illegible] satisfactorily [illegible] exactly [illegible] water [illegible] slowly [illegible]

If [illegible] the [illegible] usual [illegible] sufficiently [illegible] employed [illegible] If the [illegible] symptoms [illegible] severe cases [illegible] used the [illegible] water [illegible] portion the [illegible] If the [illegible] men and [illegible] the limitations on the third [illegible] fifth day [illegible] extract may be given at that time If the patient [illegible] therapeutic [illegible] intestinal symptoms [illegible] carbonate of soda may be exhibited Tinctures [illegible] probable [illegible] these precautions are taken and the [illegible] are given ailments will become very rare P W B S

Garrison Sutures

The supply of salmon [illegible] coming out off mill once restrict the [illegible] for the treatment of [illegible] this [illegible] in England [illegible] Essential in [illegible] electrolysis effect [illegible] the [illegible] to [illegible] [illegible] Edge of still [illegible] the [illegible] equally [illegible] salmon [illegible] September 12 [illegible] it has [illegible] supplies with [illegible] results [illegible] [illegible] Wasserman [illegible] [illegible] so good a [illegible] [illegible] parts

P W B S

DISTRIBUTING [illegible] OF LEVEL SHIP [illegible] WAR TIME

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] formerly when [illegible] considering the problem of the [illegible] as it was not difficult to [illegible] that [illegible] construction [illegible] of keeping [illegible] have [illegible] on board a very [illegible] sideration [illegible] It is a well [illegible] is not related [illegible] Engines [illegible] with a common [illegible] less [illegible] other hand a very [illegible]

By experience one [illegible] medical equipment of peace [illegible] is excellently provided with [illegible] to provide nothing useful [illegible] appeared the more often to [illegible] plans of the ship

This omission is very [illegible] profession and still more [illegible] the State contracts towards [illegible] greatest wish of the author [illegible] subject

In the other warships [illegible] a special distributing station [illegible] a temporary distributing [illegible] relief [illegible] and [illegible] ship [illegible] situation [illegible] of the [illegible] dressing station [illegible] the Yalu [illegible] moment [illegible] of the war will Russia [illegible] was forced [illegible] the position of distributing stations [illegible] better supplied

It was not [illegible] from all criticism At the time the proposed [illegible] a grave inconvenience in the examination [illegible] wounded At other times the close [illegible] of a

---

[illegible] with [illegible] [illegible] reproduced [illegible] officers [illegible] time—[illegible]

watertight door occasioned a rise of the temperature to an unbearable degree. During a long engagement the thermometer would often range to about 120° F. It would be as if one worked in an oven, and both operators and patients would be equally troubled by headaches or by vertigo on account of the great heat. Moreover a badly situated distributing station leads often to numerous inconveniences in the transport of the wounded. Elsewhere there was not room to receive the wounded after treatment. In other places one found that the smoke of the guns, ash, coal and other dust flying into the distributing station, soiled the surface of wounds as well as the dressing materials; elsewhere the construction of the ship was so defective that sailors and others were obliged to pass through the station during the execution of their duties; again elsewhere the ventilation was bad, and the confined air had a depressing effect on everyone in the station; or here when the first stock of surgical accessories was exhausted it was very difficult to renew them owing to want of easy communication between the distributing station and the storeroom; at one time there was a defect in the supply of pure water; finally, touching on other points, the proximity of large guns would cause at each shot destruction amongst the bottles and the surgical instruments.

Such was the actual condition of the distributing stations on board the Japanese warships during the war with Russia, and it is quite exceptional to find an ideal distributing station giving complete satisfaction in arrangement and position. The author considers as follows the results obtained with medical equipment as inadequate:

The aim from the opening of the war was to treat all wounds by asepsis and in practice this method was used wherever it was possible. Nevertheless in spite of all efforts, wounds suppurated frequently, and it was comparatively rare for the cases to run a smooth course. One can blame the nature of wounds received in naval warfare, they are usually of such a kind that it is difficult to prevent them from suppurating, but the cause of that must be, in part at least, due to the inadequate equipment of distributing stations. If these phenomena are compared with those which occurred in the Chino-Japanese War one will remark that, though in the recent war the cases of suppuration were numerous, this suppuration was in general superficial and healing was rapid.

One can notice a difference between the two wars, and the conclusion to be drawn from them appears to be that with distributing stations perfectly equipped the ideal treatment of hurts and wounds on board warships would be capable of realization.

It is obviously impossible to overcome entirely all the obstacles which impede the way, though the majority can be avoided when it is a question to attain a favourable course and prognosis in hurts and wounds, and accordingly to provide all the conveniences and all the resources of progress for the treatment of the wounded. Thus, from the beginning, in the plans of the ship, very special attention should be paid to the position of the distributing station, to the ways and means of transport of the wounded, and to the places for their reception. In this manner all the necessary arrangements for the distributing station can be realized to the complete satisfaction of everyone.

The increasing dimensions of the battleships and modern cruisers allow of a well defined position for exclusive use as a distributing station,

established and equipped during peace time. If, however, [illegible] do not permit such an installation in time of peace it must be [illegible] after having chosen the position everything that is necessary should be placed there at least once for trial and afterwards stored [illegible] other movable articles could be collected on board in a [illegible] in a magazine from whence they could be rapidly [illegible] position at the desired moment. This place (or the [illegible] in time of peace would have another designation, but it should [illegible] of quick and appropriate disinfection. During all the duration [illegible] it should be used for no other purpose than that of a distributing [illegible]

Number of Distributing Stations.—In the course of the Chino-Japanese War of 1894 and 1895 as already stated the Japanese warship [illegible] used the officers' wardroom as a distributing station with the result that a projectile of the enemy exploding in this place killed or [illegible] causing terrible injuries, all the persons present and destroying [illegible] surgical equipment and the wound dressings. Not one surgeon was saved to care for the surviving wounded and these did not have any medical stores with which to treat them. The author of this will never forget the grievous sight presented by the ruined wardroom at the end of the battle. In order to prevent a return of a like catastrophe it is desirable that at least two places be chosen and equipped to serve as distributing stations. If one is destroyed the other can still be used. The existence of two distributing stations situated in different parts of the ship would be also convenient for the rapid transport of wounded requiring medical aid.

Position of the Distributing Station.—The distributing station should be situated in a part of the ship as much protected as possible from the enemy's projectiles. In a warship the protection is generally much greater below the water line so that this situation would seem the suitable. But it is difficult to find a convenient spot above the lower deck, and the question of consideration must always be given to the transport of the wounded. Also it is wise in the battleships and armoured cruisers to have [illegible] equip on the lower deck places to serve as distributing stations. It is quite impossible to establish a common rule in the choice of a position for a station for this object because each ship has her own arrangements for her machinery, her engines, her means of attack and defence. We think one can lay down that a distributing station situated in the middle of the breadth of the ship with passages and means of access to port and to starboard, would be very convenient for transport of the wounded to their treatment, and for their evacuation after dressing. If the necessary care is taken in the construction and equipment of a distributing station there will not be great inconvenience if it be to port or to starboard. The earnest attention should be given to the following points:—

(*a*) When the distributing station is established in the neighbourhood of machinery or furnaces, the temperature may rise enough to hinder the work of the surgeon. A recent experience has proved this fact completely. If it is impossible to avoid altogether such places heat insulators ought to be provided for parts exposed to the heat, especially the partitions, the floors, &c.

(*b*) It is not of first importance that the distributing station be well provided with natural light. The operations which will be carried out in a hospital situated on the armoured deck require always a good artificial

light. It is important to have an excellent installation of electric or other light.

(e) Hatches with ladders should be provided close to the [illegible] station (the closer the better) for the transport of the wounded to the upper or principal deck by means of stretchers or by hand. There also, near the distributing station, ought to be provided a hatch provided with a lift. This hatch would be used as a communication between the upper deck and the station. In peace time communication could be served by means of ladders; in war time a lift would be fitted above to facilitate the transport of the wounded.

(f) Temporary rooms to screen the wounded who require aid or who have been already treated could be provided at the side of the station. For this one can adequately utilize the passages or any other convenient place on the armoured deck.

(g) The [illegible] distributing station will be chosen in all possible shelter from coal dust, powder smoke and other substances.

(h) It is best to choose a position the least exposed to vibrations caused by the firing of guns.

Dimensions of the Distributing Station.—The superficial capacity of the station ought to be from 300 to 500 square feet; the shape oblong by preference or square. Slight irregularities are permitted. The [illegible] of the watch ought to take place by a door opposite the lift and the hatch mentioned above; another door at the other side of the [illegible] would serve to remove the wounded after treatment, but in case of need the same door could be utilized for entrance and exit.

The installation would include the following items:—

(1) An operating table.

(2) Various instruments sterilized.

(3) An apparatus for sterilized water.

(4) Antiseptic instruments.

(5) An antiseptic sink.

(6) A supply of running fairly hot water.

(7) A cupboard for antiseptic dressings. It is advisable to have an [illegible] of any pattern, but it is not necessary that it be in the [illegible] as to raise the temperature and to inconvenience the [illegible] patients. It would be preferable to have it [illegible] in the bathroom or on the principal deck where they could be sterilized in advance.

Such of the [illegible] accessories constructed outside [illegible] of easy access to the opening of the inner [illegible] and sufficiently large enough to hold all the *material* and [illegible] for operations.

[illegible] and the walls ought to be generously provided with fixed [illegible].

(10) Ventilators.—Ventilators on channels with fixed interior ventilators [illegible] in each place above the upper deck ought to be sufficient. The [illegible] could be sent in abundance through the [illegible].

(11) Walls, ceiling, and floors.—To prevent deposit of dust on the walls, the ceiling, their [illegible] should be as smooth and as regular as possible. The floor should be covered with linoleum and elsewhere with a light enamel paint. Disinfection would then be easy.

[illegible]

For [illegible]
on [illegible]
fire [illegible]
help [illegible]
back [illegible]
author [illegible] would [illegible]
action [illegible] the transp[illegible]
wounded [illegible] men could [illegible]
stretchers [illegible] sent down to [illegible]
station with [illegible] applied [illegible]
author [illegible] than [illegible] lift to [illegible]
wounded [illegible] many [illegible]
a lift of this [illegible] up in the shell
tion thro[illegible] [illegible]
deck [illegible]
(stretcher) [illegible]
can be [illegible]
shocks [illegible]
in this lift [illegible]
distribut[illegible]
shirt to the [illegible]
of the [illegible]
direct [illegible]
account [illegible]
munitions [illegible] directly with it. It [illegible]
munitions because it can be dest[illegible]
and render it useless for the remainder [illegible]
a hatch with ladder not far fro[illegible] lift to
access from the upper deck to the [illegible]

This ladder would be used as a [illegible]
if the lift continued to act, becom[illegible]
on the upper deck, it is probable [illegible]
distributing station and it would be [illegible]
by the ladders, and reserve the lift [illegible]
small unarmoured ships each spot [illegible]
exposed at the same time it is very [illegible]
for a station above the water line. [illegible]
ships of this kind still utilized the off[illegible]
station but these ships were rarely [illegible]
experience of the little of the Yalu [illegible]

Transport of the Wounded.—On board [illegible]
is a problem very difficult to decide. [illegible]
ought naturally to be carried on the shield [illegible]
That is theoretically true and is the co[illegible]
neglect should not be permitted in [illegible]
The stretchers such as are used for land [illegible]
adapted for service on board; there are [illegible]

[illegible] the Russa[illegible]
[illegible] the type of
[illegible] Yotsuka'
[illegible] was found so
[illegible] stations
[illegible] practice In
[illegible] rounded
[illegible] vetchers
[illegible] adopt this
[illegible] practice
[illegible] little
[illegible] will
[illegible] one
[illegible] uncon
[illegible] ly and the exactly
[illegible] ers
[illegible] support of wounded
[illegible] distributing station and
[illegible] ship or a transport Its
[illegible] easily be modified
[illegible] wounded will have to
[illegible] stretcher to be
[illegible] countries for service
[illegible] this stretcher being made
[illegible] presents several
great [illegible]

[illegible] but an apron one is not
to be [illegible] still employed the
chief [illegible] In the tops
the [illegible] special types of
stretchers [illegible] are employed

W L M

[illegible] killed hamboo stretch[illegible]

News of the Service.

APPOINTMENTS

[illegible] O. W. [illegible] (Retired List) to [illegible].

[illegible] (Retired List) [illegible].

[illegible]

[illegible]

Staff Surgeons [illegible]

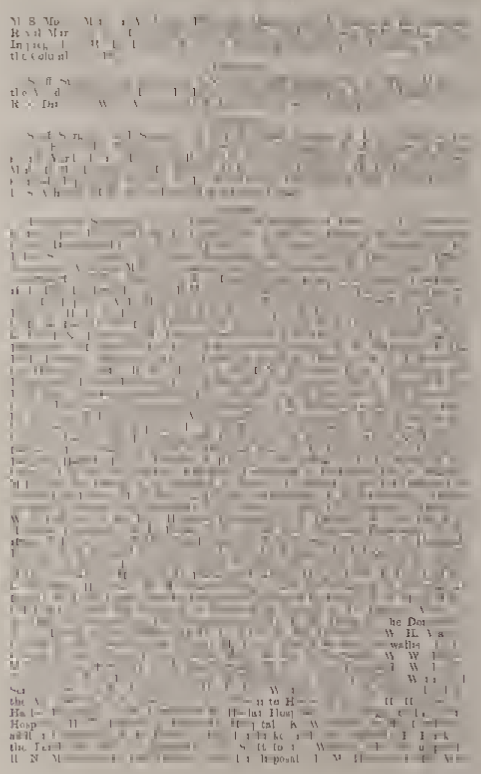
[illegible]

October

Surgeons [illegible] to the Vernon [illegible] to the Kirkwall Naval [illegible] to the Spitfire [illegible] Dreadnought [illegible] to the Roebuck [illegible] to the R.N. Hospital [illegible] to the Victor [illegible] for hospital.

November

Surgeons [illegible] to the Pembroke [illegible] to the hospital ship [illegible] to the Viking [illegible] to the Calypso [illegible] to the [illegible] J. L. Preston to the Royal Marine [illegible]



[illegible]

[illegible] Hospital [illegible] S. Hamilton [illegible] to Plymouth [illegible] Duckworth [illegible] McCracken [illegible] S. D. Kilbery [illegible] McMaster to [illegible] the Excellent [illegible] to the [illegible] Fosbery [illegible] to the Ceres [illegible] R.N.S. & Quarters [illegible] Haslar Hospital [illegible] Pembroke [illegible] Chatham Hospital [illegible] to Chatham [illegible] Haslar Hospital [illegible] to the R.N. [illegible] Hospital, Cape of Good Hope [illegible] Pembroke [illegible] Vernon [illegible] Harvey to the Hospital ship [illegible] Portsmouth Royal Marines.

Octobber.

Surgeon Probationers [illegible] to T.B.D. Badger [illegible] to T.B.D. [illegible] Gunners [illegible] T.B.D. Shark.

November.

Surgeon Probationers [illegible] to T.B.D. Garland [illegible] to T.B.D. Lysander [illegible] to T.B.D. Nereide [illegible] to T.B.D. Fury [illegible] Redpole [illegible] to T.B.D. [illegible] to T.B.D. [illegible] Locke to T.B.D. Ambuscade [illegible] Toulmin to T.B.D. [illegible] to T.B.D. [illegible] to T.B.D. [illegible] Ruggall to T.B.D. [illegible] to T.B.D. Nymphe [illegible] to T.B.D. Larne [illegible] Pocock to T.B.D. Staunch [illegible] Jones to T.B.D. [illegible] to T.B.D. Ardent [illegible] Sharp to T.B.D. Christopher [illegible] to T.B.D. Forester [illegible] to T.B.D. Hardy [illegible] Coombe to T.B.D. Sparrowhawk [illegible] to T.B.D. Unity [illegible] Pearse to T.B.D. [illegible] to T.B.D. [illegible] to T.B.D. [illegible] Leak to T.B.D. [illegible] to T.B.D. Lance [illegible] to T.B.D. Laverock.

OBITUARY

Killed in Action

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August 1914.

Killed in the "Bulwark" Disaster

FLEET SURGEON PERCIVAL KENT NIX R.A.M.C. Naval Medal

Bulwark when she was lost off Sheerness

He was educated at Cheltenham College, where he was the

on the class at Sidc He then went to Jesus College,

As an undergraduate he obtained three Blues, rowing

one the College Football Cup in the

third a swimming prize 1890 He was also exp

played His took his B.A. Medical Tripos

Class Natural Sciences Tripos, Part I. 1891, the Long

at Addenbrooke's Hospital, allowing

in 1896 he was M.B. B.C. and entered the

in his batch In the passing out

subject He served in the Channel Fleet

Hospital, the Training Squadron

SURGEON WILLIAM MILLER M.B. was

lost off Sheerness in November 1911, was

graduated in 1906

After a few months in private practice

surgeon he was appointed to the

doing four months at the Admiralty,

also two months at St. Mark's Hospital,

served in China, Then I joined the

he remained the ship until

July 1913, and the Humane Society's

diploma, and an address, both

SURGEON ROBERT TRAILL BROUGHTON R.N. was

Bulwark when

she was lost. He

Sheerness on November 26, 1911. He

Hospital and took his diploma in

an appointment as Surgeon under

was presented by the Submarine

and medal. He became Medical Officer

joined the R.N.V.R. in February, 1911

Deaths from other Causes

Surgeon-General William Mer[illegible] Craig C.B. M.B. died on August 6 1914 at his home in Chelsea. He was [illegible] Edinburgh, graduated and took his degree in 1880.

After holding the appointment of House Surgeon at the Edinburgh Infirmary he entered the Service in 1882 and [illegible] West Coast of Africa in the Channel in China (joining a ship at Hong Kong Hospital) and at Chatham Division of the Royal Marine Artillery. On the Australian Station he was in the Penguin Hospital. He was at Haslar Hospital, and in the Royal Sovereign, Majestic, Britannia, Hospital Ship Maine, Britannia, and was promoted to the rank of Surgeon and appointed to the Cape of Good Hope. He was Principal Medical Officer of Ashanti in 1895, and was awarded the Ashanti Star. He went to Hong Kong Hospital for a short time, and in 1897 was sent to India as Deputy Surgeon-General. He was promoted to the rank of Surgeon-General in 1900. When he was ordered on promotion to the rank of Surgeon-General in May 1901 he received the thanks of the Admiralty for his services. His skill as an operating surgeon was well known. He was in command of the Caledonia at the Exhibition in June 3 1904.

Staff-Surgeon Albert Lyttyn Fairfax-Hunt died of enteric fever at Denmark Hospital on October 1 1914.

He was admitted at Guy's Hospital and taking the London University Course qualified M.R.C.S., L.R.C.P. in 1906. He was Resident Medical Officer at the Poplar and Bow Hospitals, where he stayed until the War broke out. He was appointed to the Devonshire in the first week of the War.

Petty Officer William Sturgess died suddenly at sea on November 28 1914, on board the Alsatian, Armed Merchant Cruiser, of which he was Steam Medical Officer.

He was educated at St. Bartholomew's Hospital, obtained his diploma M.R.C.S., L.R.C.P. in 1888, and entered the Navy in the same year. He served on the Victoria, Chatham, Medway, Bellerophon, Queen, and in the Training Squadron. Although he had retired in 1905 he came forward again to serve his country at the outbreak of war, and was appointed to the Alsatian in August 1914.

Staff-Surgeon Harriett M.B. was drowned in December 19 1915 when returning by a Cuxhaven steamer to finish up the Inspection on the Orkneys.

He was educated at Glasgow, Weed College, Dublin, and afterwards at Leicester. He took [illegible] at the University College Dublin and in 1907 took the degree of the Royal College of Ireland. He subsequently did he was closely [illegible] with the Mount Misericordia Hospital, in Aberdeenshire, was resident at the Mid-Surrey Hospital, Gilles Street, Dublin. In May 1901 he entered the Navy as Surgeon and joined the Home Fleet, and the Mediterranean Station. He was then [illegible] to the Royal Marines at Deal and Walmer, in 1914 was granted sick [illegible] and finally at the Naval Medical School, Greenwich. Soon after the outbreak of War he joined the Grafton.

Fleet-Surgeon John Neil Robertson M.B., M.S. died on December 22 1914, at the Royal Naval Hospital, Plymouth.

He was [illegible] at the University of Glasgow, taking his degrees in 1895. He entered the Navy in March 1896, and after [illegible] at the Royal Naval Hospital, Haslar, was appointed to the Station Hospital, Trebilcan. He then joined the [illegible] of the Highflyer, and subsequently he was acted in his great [illegible] Hong Kong, and at the Naval Dockyard, he instituted a special [illegible] for the Navy. This [illegible] the Naval Rollerson [illegible] adopted by the Admiralty, and is in general use throughout the Service. In May 1901 while Staff-Surgeon, he was in charge of the Blake [illegible] and was promoted to the rank of Fleet-Surgeon for conspicuous professional [illegible].

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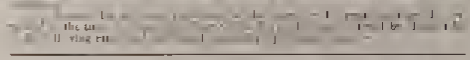

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